FORMER UNIFORMS FOR INDUSTRY SITE

129-09 JAMAICA AVENUE
RICHMOND HILL, NEW YORK
Block 9281 Lot 44
Site No. C-241103

REMEDIAL ACTION WORK PLAN

Operable Unit 1 - On Site

New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau B-12th Floor
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1.0 INTRODUCTION

The property owner, Uniforms for Industry (UFI), previously entered into a Brownfield Cleanup Program (BCP) Agreement with the New York State Department of Environmental Conservation (NYSDEC) on June 13, 2007, to investigate and remediate the property located at 129-09 Jamaica Avenue, Richmond Hill, NY (the Site). UFI conducted a Remedial Investigation of the Site from November 2008 through February 2009, and documented the findings in a Report dated April 2010 (revised August 2010).

In December 2009, Union Jamaica LLC, and its affiliates (Richmond Hill Housing LP, Richmond Hill Housing GP), as contract vendee to purchase the property, submitted an amended BCP application to delete 129 Jamaica Avenue Reclamation LLC as Volunteer to the Agreement and add Union Jamaica LLC, and its affiliates as Volunteer to the Agreement. UFI remains as a Participant to the Agreement. The amended application was executed in December 2009. The NYSDEC has decided that on-site and off-site components of the project will be tracked seperately as Operable Unit 1 (OU1) and Operable Unit 2 (OU2), respectively. OU1 will be addressed by the Volunteer and OU2 will be addressed by the Participant.

A multi-family residential use (Restricted Residential) is proposed for the property. The Site redevelopment will consist of two new residential buildings identified as Phase I and Phase II. Phase I includes a 6-story senior housing building with a cellar level used for storage/utility rooms and residential apartments on subsequent floors. Phase II includes a 7-story residential low-income apartment building with a parking garage/meter rooms on the cellar level and residential apartments on subsequent floors. Refer to **Section 1.4** and **Attachment A** of this document for additional details.

This Remedial Action Work Plan (RAWP) summarizes the nature and extent of contamination as determined from data gathered during the Remedial Investigation (RI), performed between November 2008 and February 2009 and from a supplemental investigation performed in September 2010. It provides an evaluation of a Track 4 cleanup and other applicable remedial action alternatives, their associated costs, and the recommended and preferred remedy. The remedy described in this document is consistent with the procedures defined in DER-10 and complies with all applicable standards, criteria and guidance. The remedy described in this document also complies with all applicable Federal, State and local laws, regulations and requirements. The NYSDEC and New York State Department of Health (NYSDOH) have determined that this Site poses a significant threat to human health and the environment due to soil vapors.

1.1 SITE LOCATION AND DESCRIPTION

The Site is located in the County of the Queens, New York, and is identified as Block 9281, and Lot 44 on the Queens Borough Tax Map (see **Figure 1** - Location Map). The Site is situated on an approximate 75,230 square foot (1.72-acre) area bounded by residential properties and 127th Street to the west, a residential lot to the north, Jamaica Avenue to the south and the Long Island Railroad-Ronkonkoma Line to the east (**Figure 2**).

The Site is improved with a one-story masonry building constructed in 1929 with a large 2-story masonry addition constructed in the 1990's. The combined area of the building and addition totals 55,626 sq. ft. The buildings have been vacant since November 2002, when Uniforms for Industry (UFI), a commercial laundry operation, vacated the premises. UFI has owned the property and operated its commercial laundry facility at the Site since the 1950's. Prior to UFI's occupancy, the Ideal Vortex Laundry Company operated a commercial laundry on the property from 1929 to 1957.

1.2 REDEVELOPMENT PLANS

The Site will be redeveloped through the construction of two new apartment buildings which are identified in the Architectural Plans as Phase I and Phase II. The Phase I component is a 6-story, 65 unit senior housing building which will be built in the western portion of the site at the intersection of Jamaica Avenue and 127th Street. The entire 12,090 sq. ft area (footprint) of this building will have a full depth (10ft) cellar level. The cellar will be used for tenant storage cubicles, bicycle storage, a laundry room, a trash compactor room, and mechanical/meter rooms. The exterior grounds will feature a surface parking lot, recreation area, and landscaped area.

The Phase II component includes a 7-story building with 117 units set aside for low-income housing. A full depth (10 ft) cellar level will extend beneath the entire 21,302 sq. ft area (footprint) of the building. The cellar level will be used for parking (35 spaces), bicycle storage, and mechanical/meter rooms. The exterior grounds around the Phase II building will include parking for 35 cars, access ramps for the cellar level parking garage, and landscaped areas.

Architectural drawings are provided in **Attachment A**.

1.3 SITE HISTORY

According to Phase I Environmental Site Assessments performed at the Site in August 2002 and October 2004, the property has been in continual service as a commercial laundry operation since the main building was constructed at the site in 1929.

Sanborn Maps dating back to 1901 show the property to be developed with a 2-story residential building in the south-central portion of the site. By 1911, three 1-story commercial buildings are shown in the western area of the property and are labeled as stores. The 1925 map shows the addition of two 1-story and one 2-story residential buildings in the southeastern portion of the site. In 1929, the main building was constructed in the central portion of the site and operated as a commercial laundry. By 1942, only the 2-story residence remains. A small 1-story building labeled as a store is now present east of the residence and a larger 1-story building labeled "auto collision" is shown north of the residences. Four gasoline tanks are shown near the store in the southeast corner of the property.

According to the Phase I prepared by GCE (10/04), UFI has occupied the Site since at least 1957. By 1963, the 2-story residential building is being utilized as a filling station. By 1981, the filling station building is labeled as an office building. The auto collision building, 2-story office building, and the commercial laundry building remain unchanged through 1988. In the 1990 map the auto collision building and office building are gone and a large addition is added to the

laundry building in the southeast area of the site. According to the GCE Phase I, UFI ceased operations at the Site in 2002.

Previous environmental reports indicate that fuel oil, mop oil, mineral spirits, Stoddard solvent, and Varsol solvent have been historically stored on the Site. According to the Remedial Investigation Report prepared by Environmental Liability Management, LLC (12/09), UFI used tetrachloroethene (PCE) in a dry cleaning machine from 1992 and 1997.

According to the NYSDEC Spills Database, two spill numbers are associated with the Site. Spill No. 91-01477 (reported on May 6, 1991), was related to the tank test failure of a 3,000 gallon underground storage tank. The database indicates that the spill was closed on March 7, 2003, as a result of no new information. The spill file references a second spill, No. 02-08119. The second spill is related to a tank test failure of a 6,000 gallon fuel oil underground storage tank. Contaminated soil was later discovered around the fill lines of a mineral oil underground storage tank and a diesel underground storage tank. This spill remains open.

The property is identified in the NYSDEC Petroleum Bulk Storage database as Facility Site No. 2-248541. The facility status is listed as unregulated. The database lists thirteen tanks registered for the Uniforms for Industry facility. The tanks listed include: two 6,300 gallon underground storage tank (UST) (one fuel oil, one "other"), one 7,500 gallon UST (fuel oil), three 2,000 gallon UST ("other"), three 3,000 gallon USTs (2 "other", 1 "invalid material"), one 6,000 gallon UST ("empty") and three 1,500 gallon USTs ("empty"). Eleven of the thirteen tanks are listed as closed removed. Two of the 3,000 gallon tanks are listed as "closed prior to 3/1991".

1.4 SUMMARY OF PREVIOUS INVESTIGATIONS

The following environmental reports were previously prepared for this site:

- Environmental Assessment for Chemical Bank at Five UFI, Inc. Properties, Richmond Hill,Queens, New York. Clayton Environmental Consultants, June 14, 1988.
- Subsurface Investigation of Uniforms for Industry, 129-01 Jamaica Avenue, Richmond Hill, New York. Tyree Brothers Environmental Services, Inc, May 1993.
- Status Report & Drywell Remediation, Uniforms for Industry, 129-01 Jamaica Avenue, Richmond Hill, New York. Fenley & Nicol Environmental Inc., December 18, 2002.
- Phase I Environmental Site Assessment, 129-01 Jamaica Avenue, Richmond Hill, New York, 11418. Fenley & Nicol Environmental Inc., August 20, 2002.
- Spill Investigation Report, NYSDEC Spill # 02-08119, 129-01 Jamaica Avenue, Richmond Hill, New York. Fenley & Nicol Environmental Inc., March 18, 2003.
- Uniforms for Industry, Inc, 129-09 Jamaica Avenue, Richmond Hill, NY, NYSDEC Spill No. 02-08119, Vertex Memorandum. Vertex Engineering Services, Inc., September 12, 2003.

- Uniforms for Industry, Inc, 129-09 Jamaica Avenue, Richmond Hill, NY. Memorandum. Vertex Engineering Services, Inc., April 19, 2004.

- DRAFT, Phase I Environmental Site Assessment of 129-09 Jamaica Avenue, Richmond Hill, New York. G.C. Environmental, Inc., October 26, 2004.

- Additional Subsurface Investigation of Uniforms for Industry, 129-09 Jamaica Avenue, Richmond Hill, New York, 11418. G.C. Environmental, Inc., March 29, 2006.

- DRAFT, April 2006 Offsite Investigation Activities Summary, Former UFI Jamaica Facility, 129-09 Jamaica Avenue, Richmond Hill, Queens, New York. Memorandum. ROUX Associates, Inc, June 1, 2006.

- DRAFT, January 2007 Investigation Summary, Former UFI Jamaica Facility, 129-09 Jamaica Avenue, Richmond Hill, Queens, New York. Memorandum. ROUX Associates, Inc, February 12, 2007.

- DNAPL Assessment at Former Uniforms for Industry Site, 129-01 Jamaica Avenue, Richmond Hill, New York, Gregory K. Shkuda, PhD., March 8, 2007.

1.4.1 Environmental Assessment (Clayton 6/14/88)

The report was prepared to evaluate environmental damage and potential liabilities at the Site as part of a finance application through Chemical Bank. The report identified the following environmental conditions requiring further action:

- 7 Underground Storage tanks storing a variety of products including fuel oil, Varisol and treatment oil. The report notes that the tanks are in violation of the PBS testing requirements and have not been registered with the NYC Division of Fire Prevention.

- Discharge of 120,000 gallons of wastewater to the NYC sewer system may require a permit from the NYCDEP.

- Sludge generated from the mop cleaning operation might contain hazardous chemicals and should not be disposed of with normal solid waste in the dumpster. Mop oil was also noted leaking from the dumpster.

- Spillage of Varisol sludge was noted inside the building.

- Possible asbestos containing materials (ACM) were observed.

1.4.2 Subsurface Investigation (Tyree 5/93)

The subsurface investigation report documents the installation of eight soil borings which were advanced around four USTs located outside of the building in the eastern parking area. Refusal was encountered for all borings at depths ranging from 7 feet to 11 ft. Soil samples from all five borings were reported to have elevated photoionization detector (PID) readings, although several

borings did not exhibit a petroleum odor. Soil samples that were submitted for laboratory analysis were analyzed for total petroleum hydrocarbons and/or volatile organic compounds according to EPA method 8240. Groundwater samples were not collected. The two highest PID readings were recorded in two of the borings performed relative to the same tank, however, no VOCs were detected in the sample with the highest TPH value, and only relatively low concentrations of Acetone (635 ppb), Ethylbenzene (240 ppb) m&p-Xylenes (858 ppb) and o-Xylene (320ppb) were detected in the other boring sample. The samples were not analyzed for semi-volatile organic compounds, which is the likely type of TPH contamination encountered.

1.4.3 Environmental Site Assessment (Fenley, 2002)

The Phase I report prepared by Fenley & Nicol Environmental, Inc. (Fenley) was prepared for UFI in 2002 to identify any Recognized Environmental Concerns. The items of concern identified by Fenley in the Phase I report are as follows:

- Drywells DW1 and DW2 may have been impacted with contamination;
  - ✓ Recommended sampling of drywells
- Active spill number was identified for a 3,000 gallon tank test failure;
  - ✓ Recommended contacting DEC for closure requirements
- Presence of open containers of petroleum products;
- Possibility of PCBs in hydraulic lift oil and light ballasts.
  - ✓ Recommended sampling hydraulic fluid for PCBs
- Possible asbestos containing materials (ACM) were observed (water tanks, floor tiles).
- Water staining and possible mold on second floor of original building

1.4.4 Status Report & Drywell Remediation (Fenley, 2002)

The report documents the work conducted by Fenley in reference to the recommendations made by Fenley in their 2002 Phase I report. The liquid was removed from DW1 and DW2, and the solids removed from the base of the two structures. DW2 was determined to have a solid bottom, and DW1 was undermined by approximately 4 feet. Tetrachloroethene was detected in the waste characterization sample collected from the soil/sediment removed from the structures at a concentration of 602 ppb. Other contaminants detected in the sample include 1,2,4-Trimethylbenzene (3,603 ppb), 1,3,5-Trimethylbenzene (7,397 ppb), sec-butylbenzene (580 ppb), p-isopropyltoluene (806 ppb), Naphthalene (1,292 ppb), p&m-Xylene (1,330 ppb) and o-Xylene (6,899 ppb). Only a very low concentration of sec-butylbenzene was detected within the end-point sample collected from DW1 following remediation (6 ppb).

No PCBs were detected within the sample of hydraulic fluid collected for laboratory analysis.

1.4.5 Spill Investigation Report (Fenley, 2003)

The report documents the work conducted by Fenley to address Spill No. 02-08119. Product was noted in a concrete pit located against the west side of the old main building. Fenley determined the source of the product was from piping connected to the mop oil tank located under the asphalt parking lot located on the west side of the property. One additional fuel oil tank was identified adjacent to the mop oil UST, but the tank was not described as leaking. Fenley replaced the lines to both tanks, but encountered contaminated soil while trenching for the new lines. A total of approximately 134.53 tons of contaminated soil were removed forming a hole approximately 20 feet deep. An end-point soil sample collected from the base of the excavation had a slight sweet odor, but only relatively low levels of VOCs and SVOCs were detected, and none concentrations detected above TAGM 4046 Cleanup Objectives.

1.4.6 Memorandum (Vertex, 2003)

The report documents the tank removal and contaminated soil excavation work conducted by Clean Venture and Vertex in 2003. Three mineral oil tanks were removed from the former filter room and one #6 oil tank was removed from the former mop oil room. Contaminated soil encountered during the removal of the tanks was excavated from within both the mop oil room and filter room to a depth of approximately 22 feet below grade. The report indicates both excavations were performed from wall to wall within the two rooms. However, in both rooms, contaminated soil was observed at the final excavation depth of 22 feet below grade. Therefore, after backfilling, a soil boring was conducted within each room to 30-32 feet in the mop oil room and 32-34 feet in the filter room. Both soil samples exhibited m&p-Xylene and o-Xylene concentrations above TAGM cleanup objectives.

Vertex also performed a follow-up soil boring through the excavation backfilled by Fenley in the west side parking lot. The soil sample collected from 24 to 26 below grade (approximately 4 feet below the depth of the excavation conducted by Fenley) contained a TPH concentration of 6,640 ppm.

Vertex then removed the 6,000 gallon #2 fuel oil tank located on the west side of the building parking lot, likely connected to the tank lines replaced by Fenley in 2003. Contaminated soil was encountered on the east side of the tank, but the tank appeared to be in good condition. The soil was excavated and stockpiled, but no excavation dimensions/depth are provided. No reference to the amount/tonnage of soil disposal is referenced either.

Several shallow soil samples were collected from the site by Vertex to evaluate the presence of contamination. Vertex determined the only contaminants detected within the soil samples were related to urban fill, with the exception of soil boring performed in the mop oil room, that exhibited elevated concentrations of m&p-Xylene and o-Xylene.

1.4.7 Memorandum (Vertex, 2004)

The report documents the groundwater sampling and soil sampling results related to four sampling locations (VMW1 to VMW4) performed by Vertex in 2004. The groundwater sample results showed the presence of chlorinated hydrocarbons (tetrachloroethene, trichloroethene, cis-

1,2-dichloroethene, and vinyl chloride). A second round of groundwater samples were collected from the same four monitoring wells, which confirmed the presence and concentration of the chlorinated hydrocarbons. Several of the highest concentrations of chlorinated hydrocarbons were detected in VMW-3, a monitoring well considered to be the most hydraulically upgradient monitoring well for the site. Petroleum related VOCs and SVOCs were also detected within the monitoring well installed immediately outside of the former filter room and mop oil room (VMW-1), as well as the monitoring well installed near the former line leak on the west side of the building (VMW-2).

1.4.8 Draft Environmental Site Assessment (G.C. Environmental, Inc., 2004)

The Phase I report prepared by G.C. Environmental, Inc. (GCE) was prepared for UFI in 2004 to identify any Recognized Environmental Concerns. The RECs identified by GCE in the Phase I report are as follows:

The items of concern noted within the Phase I report prepared by G.C. Environmental Inc. in 2004 are as follows:

- Overflow drywells are connected to CB1, CB2 and CB3. Since tetrachloroethylene was detected in the sludge removed from CB1(aka DW1), it is likely that overflow pools, or other onsite drywells/catch-basins have also been impacted. GCE also noted a petroleum sheen on the water in one or more of the catchbasins and the stormwater entering the catch-basins. An oily residue was also possibly observed in a drywell located on the west side of the property. The oily residue also contained low levels of tetrachloroethylene;

- Trenches installed within the main building discharged to a holding tank, then to two equalization tanks for treatment prior to discharge to the catch-basins;

- Holes and ditches observed during the inspection were identified as being connected to a historic wastewater discharge system, of which no information is available;

- Facility contained 10 USTs and 10 ASTs, and groundwater and soil sampling conducted at the site have confirmed spills of petroleum products and hazardous materials which have environmentally impacted the site;

- Facility listed twice in the LTANK database, as well as the PBS and CBS AST databases; and Sanborn maps and/or Queens County Building Department identify the southeastern portion of the subject property as a filling station (gas station) and auto collision work shop.

- Groundwater samples collected from four monitoring wells show elevated levels of chlorinated hydrocarbons and VOCs;
- The southeast corner of the subject property was utilized as a gas station, as identified in Sanborn maps and records held at the Queens County Building Department;

- Possible asbestos containing materials (ACM) were observed (water tanks, floor tiles).

GCE recommended "an additional investigation consisting of installation of additional groundwater monitoring wells and groundwater sampling should be conducted in order to delineate groundwater contamination at the Site and confirm its origins as well as subsurface soil sampling in order to determine each area of potential soil and groundwater contamination. This investigation should also address potential for off-site origins of contamination.

1.4.9 Subsurface Investigation (G.C. Environmental, Inc., 2006)

The report details the work and findings of a soil and groundwater sampling event performed in response to the recommendations outlined by the 2004 GCE Phase I Environmental Site Assessment report. GCE performed 12 soil borings and installed 8 monitoring wells. In addition, a groundwater contour map was constructed by surveying all onsite monitoring wells and collecting depth to water readings. The groundwater flow direction was calculated to be towards the southwest.

Two soil borings performed near the three tanks removed from the former filter room determined the soil was excavated to a depth of 14 feet below grade, not 22 as previously stated in the Vertex Memorandum. Soil samples from the two borings, as well as a soil sample collected from a monitoring well installed in the same area (MW8), exhibited PID values ranging from 100 to 600, and laboratory results detected slightly elevated levels of petroleum related VOCs.

Free product was observed in four of the twelve monitoring wells, ranging in thickness from 0.09 feet to 6.06 feet in MW8. A product sample collected MW8 determined the product to likely be a mixture of kerosene and 40W lubricating oil.

Groundwater sample results collected from the monitoring wells indicated that PCE, TCE and DCE are present throughout nearly the entire site, with the higher concentrations located along the northern, eastern, and southern boundaries of the site. Petroleum related VOCs were detected primarily underneath the main portion of the site and beneath the residential properties located to the west.

GCE recommended an additional investigation to determine the source of the contamination and better define the extent of contamination.

1.4.10 Offsite Investigation Summary (Roux Associates, Inc., 2006)

The report details the work and findings of a soil and groundwater sampling event performed by Roux Associates in April of 2006. Roux collected a groundwater sample from each of the 12 onsite monitoring wells, as well as from four boring locations performed offsite within the sidewalks along Jamaica Avenue and 127th Street. Soil samples were also collected from the same locations of the four new monitoring wells. The groundwater flow direction calculated by Roux reconfirmed the direction as flowing in a south-southwesterly direction. Free product was noted within MW8, MW2 and MW11, but not in MW1. Samples collected of the product noted multiple sources of different types of distillates.

Chlorinated solvents were detected within all of the onsite monitoring wells and within two of the offsite boring locations. Roux noted that the chlorinated solvent impacts appeared to be

concentrated in two distinct areas, including the east-northeast region of the site (near the former filter room and mop oil room), and the south-southwestern region, near the southwest corner of the main building. Roux also noted that the BTEX concentrations decreased significantly along the south-southwestern border of the site, and does not appear to currently be migrating offsite.

Soil samples collected from just below the groundwater table from the four offsite monitoring locations were all non-detect for VOCs with the exception of a low concentration of toluene (1.7 ppb).

1.4.11 Investigation Summary (Roux Associates, Inc., 2007)

The report details the work and findings of the groundwater sampling event performed by Roux Associates in December of 2006. Roux collected a groundwater sample from each of the 12 onsite monitoring wells that did not contain product, as well as from four new monitoring wells that they installed in December (OSW1 through OSW4) within the sidewalks of 126th Street, 129th Street and 127th Street. The four new offsite monitoring wells were installed up to several hundred feet downgradient of the site. Product was noted again within MW8, MW2 and MW11. Only a slightly measurable product sheen was noted within MW1. The BTEX plume did not appear to be migrating offsite, and there was no discernible difference between this sampling event and the groundwater sampling event they performed in April of 2006.

Roux concluded that groundwater beneath the majority of the site continues to show elevated chlorinated solvent concentrations, and the chlorinated solvent plume has migrated offsite as indicated by the chlorinated compounds detected in the offsite monitoring well installed on 129th Street (OSW1). However, Roux stated that the plume does not appear to extend much farther downgradient than OSW1.

1.4.12 DNAPL Assessment (PTC Partners, 2007)

The report was prepared by TAC Partners (TAC) on behalf of ERM to offer an opinion as to the presence of dense non-aqueous phase liquid (DNAPL) contamination at the site. Recommendations provided by PTC include the following:

- Geophysical survey of the site to locate any additional USTs or drywells;
- Investigation of the drywells, especially drywell located closest to drycleaning equipment.
- Installation and sampling of paired monitoring wells to assess the vertical distribution of PCE and its degradation products;
- Dry cleaning expert to assess machinery used at site for assessment of leak/spill potential.
- Focused investigation of possible up-gradient groundwater contamination sources.

1.5 SITE GEOLOGY / HYDROGEOLOGY

Based upon the results of previous investigations conducted at the site and upon recent soil borings advanced at the site for geotechnical analysis and during the Supplemental Investigation, subsurface materials at the site are as follows:

Historic fill materials in the upper 6 inches to 2 feet of the soil column. Historic fill contains fragments of asphalt, brick and wood, with some ash materials in a silty-sand matrix.

Non-native backfill materials to a depth of 15 feet within the former UST area in the western parking area and to a depth of 20 feet within the former UST area in the east central part of the Site. Non-native backfill consists of poorly sorted sand and silt with fine gravel and small to large cobbles.

Native soils are present directly beneath the historic fill layer. Native soils are composed of fine to coarse sand with varying amounts of fine to coarse gravel and cobbles. According to the RIR, cobbles and boulders appear to be more commonly encountered between 19 and 25 feet below the surface.

The RIR also describes soils below approximately 42 to 45 feet as fine to coarse sand, with small amounts of fine gravel present to approximately 50 feet. These sands generally become finer and better sorted with depth, and extend to a depth of approximately 115 feet. The RIR reports a clay layer from 115 to at least 120 feet.

Groundwater at the Site is present at a depth of 38 to 40 feet below the surface and generally flows in a southwesterly direction.

2.0 REMEDIAL INVESTIGATION FINDINGS

2.1 SUMMARY OF REMEDIAL INVESTIGATION REPORT

The Remedial Investigation (RI) of the Site was performed by Environmental Liability Management, LLC (ELM) on behalf of the former property owner, UFI. The field work portion of the RI was performed from November 2008 through February, 2009. ELM documented the results of the RI in a Remedial Investigation Report (RIR) dated April 16, 2010 (revised August 13, 2010). The RIR was accepted and approved by the NYSDEC in a letter dated August 30, 2010.

The purpose of RI was to gather additional data to evaluate the presence and extent of chlorinated hydrocarbons, (identified as the primary compounds of concern in the subsurface), delineate the vertical and horizontal extent of petroleum constituents in soil and groundwater (identified as secondary compounds of concern), and assess the exposure risk of contaminants released into the environment. The RI performed by ELM, and as described in the RIR, was "designed to characterize the nature and extent of on-site and off-site related impacts to media of concern and support an analysis of remedial alternatives and selection of a remedy in conjunction with a construction specific remedial objective."

The RI performed by ELM included the following tasks:

- Performance of a geophysical survey to identify subsurface structures such as drainage pools and phantom USTs, identify drainage and utility lines and to identify previously excavated (disturbed) areas of the Site;
- Sampling of all existing monitoring wells and analysis of groundwater samples for VOCs;
- The installation and sampling of 12 soil vapor probes to evaluate soil gas concentrations of VOCs;
- The installation of seven soil borings ranging in total depth from 64 to 119 feet;
- The collection of groundwater samples from multiple levels within the soil borings;
- The installation and sampling of three additional permanent monitoring wells;
- The analysis of soil and groundwater samples using a field portable gas chromatograph and a fixed base laboratory.

2.1.1 Soils

The soil boring program did not identify primary (PCE and TCE) compounds of concern (COCs) in vadose zone or saturated zone soils above Part 375 Restricted Residential Soil Cleanup Objectives (RRSCOs) during the investigation. Primary COCs were detected in vadose zone above unrestricted objectives in a single boring (B13) at a depth of 18 feet below surface. Primary COCs were not detected in saturated soils during the investigation.

Secondary (petroleum-VOC) Petroleum VOCs were detected above Restricted Residential SCOs in saturated zone soils in the former north-central UST area and in the northeastern portions of the site. The VOCs detected above RRSCOs were limited to 1,2,4-Trimethylbenzene in three borings (B13, B15, B19) within the former UST area and 1,2,4-Trimethylbenzene and 1,3,5-Trimethylbenzene in one boring (B16) in the vicinity of the former DW4 drywell in the northern part of the Site.

2.1.2 Groundwater

The sampling of existing monitoring wells identified groundwater VOC concentrations in both on-site and off-site wells above NYSDEC Technical and Operational Guidance Series Ambient Water Quality Standards for groundwater (AWQS). Two of the on-site wells, MW8 and MW11, contained liquid phase hydrocarbons (LPH) at the time of the sampling event and, as such, groundwater samples were not obtained from these locations. Primary COCs were detected above standards in all 10 of the wells sampled. Total primary COC concentrations ranged from 9 µg/L in MW7 in the northern corner of the site to 1,474 µg/L in MW1 within the former central UST area. Secondary COCs were reported above standards in 7 of the 10 wells sampled with total concentrations ranging from 12 µg/L in MW4 near the southwest property line to2,381 µg/L in MW1.

Secondary COCs above standards were also reported in the temporary vertical profile borings at a depth of 67 feet in the northeastern area of the site, with concentrations dropping vertically with depth, yet still exceeding standards at a depth of 78 feet.

2.1.3 Soil Vapor

The soil vapor sampling program included the collection of 4 sub-slab samples within the building and 8 soil gas samples collected around the building exterior within the east and west parking areas and near the north loading dock area. Sub-slab samples were collected directly beneath the slab while exterior soil gas samples were collected from implants installed to a depth of 5 feet below the surface. Chlorinated VOCs (CVOCs) were detected in all 4 subslab samples and in all 8 soil gas samples. Petroleum VOCs (PVOCs) were not detected in any of the samples. CVOC concentrations ranged from 115.9 in the southwest corner of the property to a high of 5,290,000 in the vicinity of the former central area USTs. Elevated CVOC concentrations were also reported in the vicinity of the drainage structures in the eastern parking area, beneath the building slab in the southeastern corner of the building, and in the northern corner of the site.

ELM concluded that the elevated soil vapor concentrations underneath the southern portion of the building and in the northern corner of the property appear to mainly be the artifacts of former incidental releases and site operations over the extended operating history of the facility.

2.1.4 Conclusions

The RIR concluded the following:

ELM's conceptual site model was validated for this site based on the soil, groundwater, and soil vapor sampling results. Petroleum residuals present within site soils beneath the former tank farm could continue to serve as a minor source of groundwater and vapor phase contamination.

As groundwater passes through soil containing petroleum residuals, BTEX compounds will desorb from the soil and dissolve into groundwater. Over time, however, concentrations of these constituents in the soil will decrease due to this flushing action and other processes, including biodegradation. The light non-aqueous phase liquid (LNAPL) serves as a carbon source for the anaerobic degradation of dissolved PCE/TCE. Since petroleum compounds are not considered the primary constituents of concern and appear to be largely immobile, their continued presence could be used to drive the reaction to an anaerobic state that would be favorable for the degradation of dissolved chlorinated VOCs.

Based on the groundwater sampling results there is no evidence to support a finding that secondary sources of PCE/TCE are present. Additionally, based on the generally low dissolved phase concentrations and bio-geochemical parameters, it appears that the chlorinated ethenes are being degraded and that there is no significant source contributing to the presence of dissolved phase groundwater constituents. Although dissolved VOCs in groundwater currently existexceeding applicable NYSDEC TOGS standards, it is reasonable to assume that natural degradation of these compounds will continue and eventually reach levels below TOGS standards.

2.2 SUPPLEMENTAL INVESTIGATION

In preparation of this RAWP, EBC performed a supplemental investigation at the Site to address gaps in the data set which remained following the RI and to obtain updated data on groundwater quality. Specifically, the supplemental investigation sought further information in the following areas:

- Delineate shallow CVOC and PVOC contamination to define hotspot excavation areas.
- Identify the source of elevated CVOC concentrations in soil gas in the southeastern area of the site.
- Determine if overflow pools were connected to the leaching pool systems in the east and west parking areas.
- Determine if sediments within the leaching pools were contaminated or if soil beneath the leaching pools was contaminated.
- Determine if historic fill at the site contained elevated levels of semi-volatile organic compounds (SVOCs) or metals.

The field work portion of the supplemental investigation was conducted by EBC from September 20th to October 5th, 2010. The work included the installation of 13 soil borings, excavation and sampling of leaching pools and overflow pools, the installation of 3 test pits to evaluate historic fill and a complete round of groundwater sampling from all 12 existing monitoring wells. Geoprobe drilling and excavator services for the supplemental investigation were provided by Eastern Environmental Solutions, Inc. of Manorville, NY. Laboratory analytical services were provided by York Analytical Laboratories, Inc. of Stratford, Connecticut, a New York State licensed laboratory (No. 10854).

2.2.1 Test Pits

EBC advanced 3 test pits at the Site on September 22, 2010, using a track-mounted mini-excavator (See **Figure 3**). The test pits were advanced in areas of interest in the north, east-central and southwest areas of the site to investigate subsurface structures and to evaluate the

depth and nature of historic fill materials at the site. TP1 was located in the eastern parking area beneath a depression in the ground surface that was covered with a 4 ft by 8 ft steel plate. The 5 ft x 5 ft x 5 ft deep excavation identified a 4-inch pvc drainage line which extended from leaching structure DW-1 to a 2 ft by 3 ft distribution box located approximately 40 ft west of the excavation. The pvc line exposed within the excavation had previously been repaired with a rubber "fernco" fitting. A strong tetrachloroethene (PCE or "Perc") odor was noted in the excavation. Samples were collected of the historic fill material and the base of the pit in an area with the greatest PCE odor. The distribution box was also investigated by removing the steel cover and confirming that the box had a solid concrete base. Accumulated sediment within the box had a strong Perc odor and a sample of the sediment was retained for analysis.

TP2 was advanced in the northern part of the Site in the vicinity of a former leaching pool identified as DW4 to confirm that this structure was previously removed. No evidence of the structure was found in the 15 ft x 15 ft x 8 ft deep excavation. A thin (6 in) layer of historic fill was noted in this area and sampled.

TP3 was located in the southwestern corner of the property in the vicinity of a drainage structure referred to as DW3. A one ft layer of historic fill was noted in the 5 ft x 5 ft x 5ft excavation, and sampled.

The sediment sample collected from the distribution box was submitted for analysis of VOCs by EPA method 8260. Samples obtained from test pits TP1, TP2 and TP3 were submitted for analysis of VOCs by EPA method 8260, SVOCs by EPA method 8270, pesticides/ PCBs by method 3550B and metals by EPA method 3050B.

The results, as presented in **Tables 1A through 1D,** show high concentrations of PCE within the sediment from the distribution box (803,000 µg/kg) and in soils from TP1 (170,000 µg/kg). VOCs were not detected above unrestricted cleanup objectives in TP2 or TP3. There were no exceedances in TP1 or TP3 for SVOC parameters. SVOC parameters including Benzo(a)pyrene, and Benzo(b)fluoranthene were reported above restricted residential objectives in the TP2 sample. In addition Benzo(k)fluoranthene and chrysene were reported above unrestricted objectives in TP2.

One or more metals including Barium, Chromium, Copper, Lead and Zinc were reported above unrestricted objectives in all three test pit samples (TP1-TP3). Barium, Copper and Lead were also reported above restricted residential objectives in the TP2 sample.

2.2.2 Soil Borings/Soil Sampling

On September 27, 2010, EBC advanced 5 soil borings at the Site (see **Figure 4**) using a Geoprobe DT6600 truck mounted probe machine and the double-tube sampling system. The double-tube sampling system uses a 2-inch diameter stainless steel outer rod and a 1.5-inch stainless steel inner rod to retrieve discrete samples in 5-ft intervals. The inner rod is fitted with a 1.5-inch by 5 ft long disposable acetate liner to assure sample integrity. Samples were collected continuously in 5-ft intervals to the final depth. Samples were examined in the field for physical evidence of contamination (staining, odor, sheen, etc.) and screened for total VOCs a using a photoionization detection. All observations including a detailed lithologic description were recorded in a bound, site-dedicated field notebook. All observations were made by a qualified and experienced environmental professional. With the exception of 10-B6, one sample from each boring representing the greatest degree of contamination was retained for laboratory analysis of

VOCs by EPA method 8260. If no evidence of contamination was observed, the deepest sample was retained.

Borings 10-B1 through 10-B3 were installed in the former UST area on the east side of the building. A fourth planned well 10-B4 could not be installed due to access issues. Soils recovered from these borings were described as non-native fill material to a depth of 15 feet followed by a native silty-sand layer. Petroleum odors were noted in the 10-B2 and 10-B3 borings (located within the former mop oil and filter rooms) in the 15-20 foot samples.

Boring 10-B6 was advanced in the former dumpster area in the east parking lot, where mop oil was reported to have routinely leaked from the dumpsters. The boring was advanced to a final depth of 30 feet with no indications of non-native fill, petroleum staining or odors. A sample was not retained from this location.

Boring B-13 was advanced through the distribution box, which as discussed in section 2.2.1 above, had high concentrations of PCE in sediments accumulated in the base of the box. Sample cores from the 0-5 ft interval and the 5-10 foot interval displayed the highest PID readings and strong "Perc" odors. PID readings and odors were dramatically reduced in the 10-15 ft sample.

On October 4, 2010, EBC returned to the Site to advance 8 additional borings (10-B7 through 10-B12, 10-B14 and 10-B15) to delineate the PCE contamination noted within the distribution box and test pit (TP1). A ninth boring (10-B5) was also advanced in the northern part of the Site in the vicinity of the former leaching pool (DW4). Each boring was advanced to a final depth of 15 feet or rejection. With the exception of 10-B15, two samples were retained for analysis of VOCs by EPA method 8260 from each boring representing both the shallowest (0-5 ft) and the deepest (10-15 ft).

The results as presented in **Tables 2A-2C**, show detections of PVOCs in borings 10-B2 and 10-B3 in the former tank area at a depth of 15-20 ft. There were no exceedances in restricted residential objectives in either sample, however 1,2,4-Trimethylbenzene was reported above its unrestricted objective at both locations. These results, and the absence of observed contamination above the 15 foot interval, are consistent with the September 12, 2003 tank excavation memo by Vertex Engineering which stated that all soils within the former mop room and filter room were excavated to a depth of 20 to 22 feet, and that the excavation was extended to and bounded by, the footing walls on all four sides.

PCE was reported above restricted residential objectives in borings 10-B12 (0-5 ft) and 10-B13 (5-10 ft) located within TP1 and the distribution box, respectively. TCE and Cis-DCE were also reported in these samples above unrestricted objectives. In addition, 1,1,1-TCA was also reported above unrestricted objectives in the 10-B12 sample.

VOCs were not reported above unrestricted objectives in samples from any of the remaining boring locations (10-B1, 10-B5, 10-B7 through 10-B11, 10-B14 and 10-B15). **Table 3** is a summary of exceedacnces in unrestricted and restricted residential objectives for all samples collected during the Supplemental Investigation, RI and all previous investigations. These exceedances are also posted on **Figure 5.**

2.2.3 Monitoring Wells/Groundwater Sampling

On September 20, and 21, 2010, EBC performed a full round of groundwater sampling from all

existing monitoring wells. Prior to sampling a synoptic round of depth to water measurements were made in each well using an electronic water level meter. Wells with a history of liquid phase hydrocarbons (LPH) were gauged with an interface probe to check for LPH. MW11 was the only well with measurable LPH with thickness of 0.04 ft recorded.

With the exception of MW11, all wells were then purged using a submersible pump and sampled using a 1.5-inch polyethylene bailer which was discarded between sampling locations. The LPH in MW11 was confirmed with a bailer and a sample retained for analysis. The LPH was then bailed off and a groundwater sample was collected using a new disposable bailer.

Samples were retained in properly labeled, and pre-acidified laboratory supplied glassware and placed in individual, labeled, zip lock bags. After placing in the bags, the samples were stored in a cooler with water and ice to maintain a temperature of 4^{o}C. Samples were transported under chain-of-custody documentation to EBC's office by the sampling crew and picked up by laboratory dispatched courier for delivery to the laboratory (York).

Tables 4A-4C include a summary of groundwater results from the September 2010 sampling event as well as all previous sampling rounds. Total VOC, CVOC and PVOC results for all sampling events area posted in **Figure 6.** As shown in the figure, the concentrations of both CVOCs and PVOCs in groundwater have decreased in monitoring wells in the northern part of the site and along the eastern property line while PVOCs and/or CVOCs have generally increased in the central area of the property. PVOC concentrations in MW1 near the old tanks increased substantially, while CVOCs increased substantially in MW10 which is generally downgradient of MW1 and the former tank area. However, MW8, which has only been sampled once out of the four previous sampling results, and which is in-between MW1 and MW10, shows a substantial decrease in both CVOCs and PVOCs from that of the previous round (4/06).

Both MW12 and MW4, which are key wells located along the downgradient property line (southwest corner), show significant decreases CVOCs. The concentrations in MW4 are the lowest total CVOC concentrations reported since 2004.

2.2.4 Leaching Structures

On September 22, 2010, shallow excavations were performed at the site to expose known drainage structures in the east and west parking lots, identify drain line origins and termination points, and determine if additional leaching structures were present. A preliminary site inspection performed on August 18, 2010, by EBC, identified three surface drain structures and a small distribution box. Two of the structures, identified as DW1 and DW2 on previous investigation maps were located in the east parking lot along with the distribution box. The third structure, identified previously as DW3, was located in the west parking lot. A fourth surface drain structure identified as DW4 and located in the northern part of the Site on previous maps could not be located. Details regarding these structures and possible related overflow pools were not fully documented.

Using a small track mounted excavator, EBC was able to determine that the two known surface drainage structures (DW1, DW2) were leaching pools which were connected in series to 4 additional leaching pools (OP1-OP4) with sub-grade covers. All were constructed of perforated pre-cast concrete rings, 10-ft in diameter, with open bottoms. All appeared to be installed to a depth of approximately 10 feet below grade. A 6-inch drain line was noted on the north side of

DW1 which was traced north toward the rear of the property. A 4-inch drain line was noted in the southwestern part of the pool which was traced back to a small distribution box located 50 ft southwest of the pool and 40 ft east of the building. The distribution box contained two other lines; a 2-inch line which ran north toward the rear of the property and a second 2-inch line which ran south toward the building. In addition to the inlet and outlet lines which connected it to other pools in the series, OP-2 had a third 4-inch line which ran south directly to the building.

DW3 was found to be a 2-ft diameter by 2-ft deep surface drain catch basin constructed of concrete with a open base and a grate at the surface. It was connected to two overflow leaching pools identified as OP1-west and OP2-west. Based on the configuration of the pools and potential for contamination, a bottom sediment sample was collected OP1-west and submitted for analysis of VOCs, SVOCs, pesticides/PCBs and metals. To determine if VOCs were present in higher concentrations below the sediments, a soil core was taken from 10 ft below the base of pools DW1, DW2, OP1 and OP1-west on October 5, 2010, using a geoprobe machine and the dual-tube discreet interval sampling method described previously.

The results of the drainage pool sampling (**Tables 5A-5C**) indicate that VOCs, SVOCs and metals were detected in sediments from the eastern pools. VOCs and metals were reported in the western pool. VOCs and SVOCs when detected were below unrestricted objectives. Metals including chromium, copper, lead and zinc were reported above unrestricted criteria in the two eastern pools sampled. Copper, lead and zinc were above unrestricted criteria in the western pool sample. VOC results from 10 ft below the base of the pools had several isolated and insignificant VOC detections.

The results indicated that while the pools likely received wastewater contaminated with VOCs in the past, they do not represent a source of VOC contamination to the groundwater. SVOCs and metals reported in the pools are likely related to roof and surface runoff. The pools will need to be remediated and properly closed under the USEPA's underground injection control (UIC) program.

2.3 CONTAMINATION CONDITIONS

2.3.1 Conceptual Model of Site Contamination

The Site's long history as a commercial laundry service has resulted in the release of both petroleum products and chlorinated solvents in multiple areas of the property. The main products stored and released at the site include: fuel oil, mop oil/treatment oil/mineral oil, varisol/varsol/mineral spirits and tetrachloroethene. Fuel oil, mop oil and mineral spirits were stored in underground storage tanks in the east-central area of the site. Mop oil and fuel oil were stored in underground tanks in the western parking area. Leaks in the UST systems in both areas were previously documented. The depth of contamination in the central tank area was found to have extended to the water table, approximately 40 feet below the surface. Contamination in the western tank area was not reported to extend beyond a depth of 20 feet.

A free phase petroleum product composed of varying percentages of mop oil, mineral oil and mineral spirits reached the water table in the central UST area. PVOCs included Trimethylbenezene, Propylbenzene, and Xylene began to dissolve in the groundwater and form a PVOC plume which began to migrate with groundwater flow. The flow of groundwater was likely affected by the operation of one to three water high capacity supply wells which have

historically operated on the property. Operation of the wells would serve to not only influence groundwater flow but also to lower the water table locally, resulting in a deeper "smear zone" of the free phase products released in the central UST area. It is probable that petroleum products had been leaking for some period of time and preceded the release of PCE at the Site. This is likely to be the case since the use of petroleum products predated the use of PCE at the Site by at least 50 years and since PCE was not stored at the Site in UST systems or in quantity. PCE was likely released at the Site directly to the surface in two and possibly three areas of the Site including the central UST area where the dry cleaning machines where located, the drainage system distribution box located in the east parking lot and possibly in the northern loading dock area through incidental spillage.

PCE did not reach the water table in a free phase form as CVOC contamination has not been reported anywhere on the Site at a depth greater than 18 ft. In addition, the CVOC concentrations in groundwater are not elevated enough to suggest direct contact between groundwater and the source. It is therefore highly likely that PCE has been transported to the water table as a dissolved component when surface run-off or drainage water has come in contact with shallow PCE contaminated soil.

Upon reaching the water table as a dissolved component in transport water, the PCE formed one or more low concentration plumes. Commingling of the petroleum VOC plume and the PCE plume has resulted in reductive dechlorinization of the PCE to TCE, cis-DCE and Vinyl Chloride. With the source of petroleum contamination removed in 2004 when the USTs and shallow contaminated soils were excavated, the concentrations of both PVOCs and CVOCs in groundwater have been steadily decreasing.

The PCE contamination which remains in shallow soil in hotspot areas near the drainage system in the eastern parking lot is volatilizing into the vapor phase causing elevated soil gas concentrations in this area of the site. Shallow PCE contaminated soils are likely responsible for the elevated soil gas concentrations in the central UST area and in the northern part of the site. A small shallow hotspot area of PCE contamination has been documented near the former central UST area in borings by ELM (B13) and Vertex (VSB3). However, test pits and borings located in the northern part of the site have not identified shallow CVOC contamination in this area. It is extremely unlikely that the CVOC concentrations in soil gas are related to dissolved CVOCs in groundwater due to low concentration and the 40 feet depth to groundwater.

PVOCs have not been reported in soil gas in any area of the Site. This is likely due to the absense of shallow PVOC contamination in soils, the relatively low dissolved concentration in groundwater, the 40 ft depth to groundwater, and the physical characteristics of the contaminants in question (Trimethylbenzene, Xylene, etc.) which have a low potential for transfer from the aqueous phase to the vapor phase.

2.3.2 Identification of Source Areas

The former UST area located in the central part of the Site has been identified as the primary source area of free-phase petroleum and PVOC's which have affected groundwater. This area has been previously remediated by excavation to a depth of 20-22 ft. The USTs in the western parking area have not been shown to be a source.

Shallow PCE contaminated soils just south of the central UST area, in and beneath the distribution box in the east parking area and in the vicinity of a repaired line extending from the distribution box have all been identified as sources of CVOC contamination in groundwater and soil gas. These areas will be remediated as part of the remedial plan for the Site. Additional shallow PCE sources may be encountered during Site redevelopment and should be anticipated. The location of existing source areas is shown on **Figure 7**.

2.3.3 Soil/Fill Contamination

Historic fill has been identified throughout most of the site. The depth varies from 6 inches to approximately 2 ft. The fill material contains several SVOCs and metals including Barium, Chromium, Copper, Lead and Zinc above unrestricted objectives. Barium, Copper and Lead were also reported above restricted residential objectives in some areas. Historic fill material will be removed from the Site under this RAWP and as part of the planned redevelopment activities.

2.3.4 Liquid Phase Hydrocarbons

Liquid phase hydrocarbons (LPH) have previously been reported at the site. Recent gauging has shown only very small accumulations in a single well, MW1, located in the southwest area of the Site.

2.3.5 On-Site and Off-Site Groundwater Contamination

On-site groundwater contamination consists of dissolved phase petroleum VOCs including 1,2,4 and 1,2,5 Trimethybenzenes, Ethylbenzene, Naphthalene, Toluene, Xylene, Isopropylbenzene, n-Butylbenzene, n-Propylbenzene, p-Isopropyltoluene and sec-Butylbenzene. The concentrations of PVOCs range from non-detect in the northern part of the site and along the northeast property line to a high of 3,686 µg/L in the former central UST area. PVOCs at the down gradient property line range in total concentration from 5 µg/L to 9 µg/L and have not been reported in off-site monitoring wells.

CVOC detections include PCE, TCE, cis-DCE and Vinyl Chloride. Total CVOC concentrations range from 1 µg/L in the northern part of the Site to 1,910 µg/L in the central area of the site (down gradient of the central area USTs). CVOCs at the down gradient property line have been steadily decreasing over time and range from 29 µg/L to 176 µg/L. CVOCs have been reported in a single off-site monitoring well at low concentrations.

2.3.6 On-Site and Off-Site Soil Vapor Contamination

CVOCs were detected in all 4 subslab and in all 8 soil gas samples performed during the RI. PVOCs were not detected in any of the samples. CVOC concentrations ranged from 115.9 in the southwest corner of the property to a high of 5,290,000 in the vicinity of the former central area USTs. Elevated CVOC concentrations were also reported in the vicinity of the drainage structures in the eastern parking area, beneath the building slab in the southeastern corner of the building, and in the northern corner of the site.

The NYSDEC has requested that the former owner of the Site, UFI, conduct an off-site soil vapor sampling program. UFI, through their environmental consultant, ELM, submitted an off-site sampling plan to the NYSDEC in December 2009. The plan was approved by the NYSDEC and NYSDOH and is scheduled to be implemented shortly.

2.4 ENVIRONMENTAL AND PUBLIC HEALTH ASSESSMENTS

2.4.1 Qualitative Human Health Exposure Assessment

The RI prepared by ELM included a Qualitative Human Health Exposure Assessment prepared in accordance with NYSDEC and NYSDOH guidance (DER-10) which considers the following five elements in defining exposure pathways:

1. A source of contamination;
2. Contaminant transport from the source, through any environmental medium (soil, groundwater, air);
3. People who may be exposed to contamination (receptors);
4. A point of contact; and
5. An exposure route or routes for contaminants to be taken in by the receptor (e.g., through dermal contact, ingestion and/or inhalation).

The assessment considered actual or potential human exposures to contaminated site soil, groundwater, and vapor or dust emissions during and after the re-development of the site. The assessment identified the following potentially exposed populations:

- Construction and remedial workers at the site, who could encounter contaminants on a short-term basis during construction activities such as soil excavation and sampling operations;
- Future site occupants who will be present at the site on a routine basis.

The following exposure pathways were considered most applicable to the site:

- Dermal absorption through direct contact with soil;
- Incidental soil ingestion; and,
- Inhalation of airborne volatiles.

The assessment indicated that potential exposures were found to occur only during site remediation and construction but not under future use scenarios, thus not impacting future occupants of the site, assuming that all elements of an approved RAWP would be implemented.

The following potential exposure pathways were determined to be complete during the construction activities:

- Potential exposures of construction and remedial workers to shallow soil;
- Potential exposure of construction workers, nearby residents and visitors to dust or vapors generated during construction activities.

However, the assessment indicated that these exposures would be greatly minimized as long as the appropriate preventive measures discussed above were implemented in accordance with a Health and Safety Plan.

2.4.2 Fish & Wildlife Remedial Impact Analysis

A fish and wildlife impact analysis was not conducted as part of the RI.

2.5 REMEDIAL ACTION OBJECTIVES

Based on the results of the RI, the following Remedial Action Objectives (RAOs) have been identified for this Site.

2.5.1 Soil

Soil RAOs for Public Health Protection:

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of or exposure to, contaminants volatilizing from contaminated soil.

Soil RAOs for Environmental Protection:

- Prevent migration of contaminants that would result in groundwater or surface water contamination.
- Prevent impacts to biota due to ingestion/direct contact with contaminated soil that would cause toxicity or bioaccumulation through the terrestrial food chain.

2.5.2 Groundwater

Groundwater RAOs for Public Health Protection:

- Prevent ingestion of groundwater containing contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of, volatiles emanating from contaminated groundwater.

Groundwater RAOs for Environmental Protection

- Restore ground water aquifer, to the extent practicable, to pre-disposal/pre-release conditions.
- Prevent the discharge of contaminants to surface water.
- Remove the source of ground or surface water contamination.

3.0 ALTERNATIVES ANALYIS

The goal of the remedy selection process under the BCP is to select a remedy that is protective of human health and the environment taking into consideration the current, intended and reasonably anticipated future use of the property. The remedy selection process begins by establishing RAOs for media in which chemical constituents were found in exceedance of NYSDEC standards, criteria and guidance values (SCGs). A remedy is then developed based on the following nine criteria:

- Protection of human health and the environment;
- Compliance with SCGs;
- Short-term effectiveness and impacts;
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, or volume of contaminated material;
- Implementability;
- Cost effectiveness;
- Community Acceptance; and
- Land use.

The following is a detailed description of the alternatives analysis and remedy selection to address impacted media at the Site. This analysis was prepared in accordance with 6 NYCRR Part 375-1.8(f) and Part 375-3.8(f) and Section 4.3(c) of NYSDEC DER-10. As required, a minimum of two remedial alternatives (including a Track 1 scenario) are evaluated, as follows:

- Alternative 1 - Track 1, remediation of all soils above bedrock to unrestricted use criteria. Excavation to a minimum depth of 40 feet in the former central UST area and north loading dock area, chemical oxidant treatment of residuals and groundwater, removal of a minimum of the top 2 feet of soil across the site and replacement with certified clean fill / topsoil. This alternative does not allow the use of long-term institutional /engineering controls to address impacted media or prevent exposures.

- Alternative 2 - Track 2, remediation of all soils above bedrock to restricted residential criteria, or to a depth of 15 feet if soils below 15 feet do not represent a source of contamination. Excavation to a minimum depth of 40 feet in the former central UST area and north loading dock area, chemical oxidant treatment of residuals and groundwater, removal / replacement of the top 2 feet of soil in landscaped / green areas. Alternative 2 includes the installation of a vapor barrier and sub-slab depressurization system beneath the basement levels of the new building which will not have continuous mechanical ventilation. This alternative does not allow the use of long-term institutional /engineering controls to meet soil cleanup objectives. Long-term institutional /engineering controls are allowed to address or prevent exposures from other impacted media.

- Alternative 3 - Track 4, remediation of all soils to a maximum depth of 15 feet to restricted residential criteria. This alternative will include excavation to a maximum depth of 20 feet in identified CVOC hot spot areas near the former central UST area and at the east parking lot drainage system distribution box and line repair area, chemical oxidant treatment of petroleum VOC residuals at the water table near the former central

UST area and of petroleum VOCs and CVOCs in groundwater and removal / replacement of the top 2 feet of soil in landscaped / green areas. This Alternative also includes the installation of a vapor barrier and sub-slab depressurization system beneath the basement levels of the new building which will not have continuous mechanical ventilation.

3.1 REMEDIAL ALTERNATIVE 1

The following sections provide an evaluation of Alternative 1 based on the nine evaluationcriteria as previously discussed.

3.1.1 Overall Protection of Human Health and the Environment

Alternative 1 will be protective of human health and the environment by eliminating the VOC and CVOC concentrations present in all subsurface affected soils at the site and by eliminating constituents in surficial soils related to historic fill. The potential for human and environmental exposure to these constituents on-site will be eliminated by excavation of the all soils above the water table with parameters in excess of unrestricted criteria, disposing of excavated materials off-site and backfilling as needed with certified clean fill/topsoil. Although residual soil contamination below the water table and affected groundwater would not affect human health, chemical oxidant treatment would be expected to meet unrestricted soil objectives and improve groundwater quality further.

Potential post-remediation exposures to on-site and off-site residents from soil vapors are not expected, though groundwater use will be restricted at the Site until groundwater quality recovers.

During remedial and construction activity workers and area residents may be exposed to impacted soil and vapors. Worker exposure to soil and vapors will be minimized through implementation of a Health and Safety Plan. Exposures to area residents from dust and/or vapors will be minimized through the use of engineering controls and through implementation of a Community Air Monitoring Plan (CAMP).

3.1.2 Compliance with Remedial Goals, SCGs and RAOs

Alternative 1 will achieve compliance with the remedial goals, SCGs and RAOs for soil through source removal to Track 1 unrestricted cleanup levels. SCGs for groundwater may not be achieved; however, bulk reduction in groundwater contamination will be realized and is consistent with the RAOs established for the Site. Compliance with SCGs for soil vapor is expected following completion of the remedial action.

3.1.3 Long-Term Effectiveness and Permanence

Alternative 1 achieves long term effectiveness and permanence by permanently removing and/or remediating all soils affected by Site contaminants or historic fill materials. Bulk reductions in groundwater contamination as implemented under Alternative 1 will also be permanent. Under this Alternative, risk from soil impacts is eliminated and risk from groundwater impacts

significantly reduced. Alternative 1 will continue to meet RAOs for soil and groundwater in the future, providing a permanent long-term solution for the Site.

3.1.4 Reduction in Toxicity, Mobility or Volume Through Treatment

Alternative 1 will permanently eliminate the toxicity, mobility, and volume of contaminants from on-site soil by meeting unrestricted objectives. The removal/remediation of on-site soil will also reduce the toxicity, mobility, and volume of contaminants within on-site soil vapor. Treatment of soil below the water table and groundwater will reduce the toxicity, mobility, and volume of contaminants in on-site groundwater.

3.1.5 Short-Term Effectiveness

The potential for short-term adverse impacts and risks to the workers, the community, and the environment during the implementation of Alternative 1 is minimal.

Short-term exposure to on-site workers during excavation and loading activities will be addressed with a HASP and mitigated through the use of personal protective equipment, monitoring and engineering controls. Potential short-term exposure to the surrounding community will be addressed through the use of odor and dust-suppression techniques and through the implementation of a CAMP which will require air monitoring activities during all excavation and soil disturbance activities.

Other potential impacts to the community such as construction-related noise, vibrations and traffic, will be controlled and regulated under the terms of the NYS Department of Buildings issued building permit which can place a Stop Work Order on the property for unsafe conditions, community impacts or violation of the terms and conditions of the permit. Decontamination procedures of equipment, including trucks transporting soil to off-site disposal facilities, will minimize the potential for impacted soil to be dispersed beyond the Site boundary. A truck traffic plan will also be prepared to minimize disturbance to the local roads and community.

3.1.6 Implementability

The techniques, materials and equipment to implement Alternative 1 are readily available and have been proven effective in remediating the contaminants associated with the Site. Excavation for the remediation of soils is both a "low tech" and reliable method which has a long and proven track record on the remediation of hazardous waste and petroleum spill sites.

However, excavation to a depth of 40 ft or more represents considerable technical challenges which in this case limit its feasibility. Sloping and shoring requirements for a 40 ft deep excavation would present significant construction challenges and would impede and interfere with the construction of the new building. Areal expansion of the excavation would likely be impossible in the event that contaminants above unrestricted criteria were identified in end-point verification samples. Documented contaminants significantly below the water table would add further difficulty in employing excavation alone as a means to remediate soil. Oxidant injections to attain unrestricted objectives in deep soils would require massive volumes of oxidant and may not fully achieve goals within the 5-year limit under Track 1.

Excavation to this depth would likely be administratively unfeasible due to the proximity of the site to the LIRR Ronkonkoma line and the required approval of this agency for work adjacent to the railroad tracks.

3.1.7 Cost

Costs associated with Alternative 1 are estimated at approximately $4,500,000. This cost estimate includes the following elements and assumptions:

- Excavate to a depth of 40 ft within an 11,000 sf area;
- Disposal of excavated soil as nonhazardous;
- Shoring using sheet piling and sloping;
- Excavation of shallow hot-spot CVOC areas to 20 ft;
- Disposal of hotspot soils as a hazardous waste;
- Treatment of soil below 40 ft and groundwater using 150,000 pounds of oxidant;
- No Sub Slab Depressurization System (SSDS) beneath new construction;
- HASP and CAMP monitoring for the duration of the remedial activities.

3.1.8 Compatibility with Land Use

The proposed redevelopment of the Site is compatible with its current R5 residential zoning (with C2-3 commercial overlay). Following remediation, the Site will meet unrestricted use objectives which will exceed the objectives for its planned multi-tenant residential use. A groundwater use restriction will be required to prevent future exposure to affected groundwater.

3.1.9 Community Acceptance

No questions regarding the Site have been raised regarding remedial options to date. This RAWP has been subject to a 45-day public comment period to determine if the community had comments on the presented remedial alternatives and selected remedy. Since no comments were received regarding Alternative 1, it is considered to be acceptable to the community.

3.2 REMEDIAL ALTERNATIVE 2

The following sections provide an evaluation of Alternative 2 based on the nine evaluation criteria as previously discussed.

3.2.1 Overall Protection of Human Health and the Environment

Alternative 2 will be protective of human health and the environment by eliminating the VOC and CVOC concentrations present in subsurface soils above restricted residential criteria at the Site and by eliminating constituents related to historic fill in landscaped/exposed soil areas. The potential for human and environmental exposure to these constituents on-site will be eliminated by excavation of all soils with parameters in excess of restricted residential criteria, disposing of excavated materials off-site and backfilling as needed with certified clean fill/topsoil. Although residual soil contamination below the water table and affected groundwater would not affect

human health, chemical oxidant treatment would be expected to meet restricted residential soil objectives and improve groundwater quality further.
Potential post-remediation exposures to on-site residents from soil vapors would be addressed through the use of a vapor barrier and a SSDS beneath basement levels which are not required to be equipped with mechanical ventilation (parking garage). Post remedial exposures to off-site residents from soil vapors are possible though not expected. Off-site vapor impact will be addressed, if necessary, under OU2. Groundwater use will be restricted at the Site until groundwater quality recovers.

During remedial and construction activity, workers and area residents may be exposed to impacted soil and vapors. Worker exposure to soil and vapors will be minimized through implementation of a HASP. Exposures to area residents from dust and or vapors will be minimized through the use of engineering controls and through implementation of a CAMP.

3.2.2 Compliance with Remedial Goals, SCGs and RAOs

Alternative 2 will achieve compliance with the remedial goals, SCGs and RAOs for soil through source removal to restricted residential cleanup levels. SCGs for groundwater may not be achieved, however, bulk reduction in groundwater contamination will be realized and is consistent with the RAOs established for the Site. Compliance with SCGs for soil vapor is expected following completion of the remedial action.

3.2.3 Long-term Effectiveness and Permanence

Alternative 2 achieves long term effectiveness and permanence by permanently removing and/or remediating all soils affected by Site contaminants above restricted residential objectives and by removing and replacing historic fill materials with constituents above unrestricted objectives from all future exposed soil areas. Bulk reductions in groundwater contamination as implemented under Alternative 2 will also be permanent. Under this Alternative risk from soil impacts is eliminated for on-site residents and significantly reduced for off-site residents. Risk from groundwater impacts is also significantly reduced. Alternative 2 will continue to meet RAOs for soil and groundwater in the future, providing a permanent long-term solution for the Site.

3.2.4 Reduction in Toxicity, Mobility or Volume through Treatment

Alternative 2 will permanently eliminate the toxicity, mobility, and volume of contaminants from on-site soil by meeting restricted residential objectives. The removal/remediation of on-site soil will also reduce the toxicity, mobility, and volume of contaminants within on-site soil vapor. Treatment of soil below the water table and groundwater will reduce the toxicity, mobility, and volume of contaminants in on-site groundwater.

3.2.5 Short-term Effectiveness

The potential for short-term adverse impacts and risks to the workers, the community, and the environment during the implementation of Alternative 2 is minimal. Short-term exposure to on-site workers during excavation and loading activities will be addressed with a HASP and

mitigated through the use of personal protective equipment, monitoring and engineering controls. Potential short-term exposure to the surrounding community will be addressed through the use of odor and dust-suppression techniques and through the implementation of a CAMP which will require air monitoring activities during all excavation and soil disturbance activities.

Other potential impacts to the community such as construction-related noise, vibrations and traffic will be controlled and regulated under the terms of the NYS Department of Buildings issued building permit which can place a Stop Work Order on the property for unsafe conditions, community impacts or violation of the terms and conditions of the permit. Decontamination procedures of equipment, including trucks transporting soil to off-site disposal facilities will minimize the potential for impacted soil to be dispersed beyond the Site boundary. A truck traffic plan will also be prepared to minimize disturbance to the local roads and community.

3.2.6 Implementability

The techniques, materials and equipment to implement Alternative 2 are readily available and have been proven effective in remediating the contaminants associated with the Site. Excavation for the remediation of soils is both a "low tech" and reliable method which has a long and proven track record on the remediation of hazardous waste and petroleum spill sites.

However, excavation to a depth of 40 ft or more represents considerable technical challenges which in this case limit its feasibility. Although the area of excavation will be less than that for Alternative 1, a 40 ft deep excavation would still be employed with sloping and shoring requirements still representing a significant construction challenge, which would impede and interfere with the construction of the new building. Areal expansion of the excavation would remain likely impossible under this alternative in the event that contaminants above unrestricted criteria were identified in end-point verification samples. Documented contaminants significantly below the water table would add further difficulty in employing excavation alone as a means to remediate soil. Oxidant injections to attain restricted objectives in deep soils may not fully achieve goals within the 5-year limit under Track 2 for attaining soil criteria.

Excavation to the 40 ft depth even under a reduced area would likely be administratively unfeasible due to the proximity of the site to the LIRR Ronkonkoma line and the required approval of this agency for work adjacent to the railroad tracks.

3.2.7 Cost

Costs associated with Alternative 2 are estimated at approximately $3,200,000. This cost estimate includes the following elements and assumptions:

- Excavate to a depth of 40 ft within an 8,500 sf area;
- Disposal of excavated soil as nonhazardous;
- Shoring using sheet piling and sloping;
- Excavation of shallow hot-spot CVOC areas to 15 ft;
- Disposal of hotspot soils as a hazardous waste;
- Treatment of soil below 40 ft and groundwater using 70,000 pounds of oxidant;
- Vapor barrier and SSDS beneath new construction basement levels w/o garage;
- HASP and CAMP monitoring for the duration of the remedial activities;

3.2.8 Compatibility with Land Use

The proposed redevelopment of the Site is compatible with its current R5 residential zoning (with C2-3 commercial overlay). Following remediation the Site will meet restricted residential use objectives which is appropriate for its planned multi-tenant residential use. A groundwater use restriction will be required to prevent future exposure to affected groundwater.

3.2.9 Community Acceptance

No questions regarding the Site have been raised regarding remedial options to date. This RAWP has been subject to a 45-day public comment period to determine if the community had any comments on the presented remedial alternatives and selected remedy. Since no comments were received regarding the Alternative 2 remedy, it is considered to be acceptable to the community.

3.3 REMEDIAL ALTERNATIVE 3

The following sections provide an evaluation of Alternative 3 based on the nine evaluation criteria as previously discussed.

3.3.1 Overall Protection of Human Health and the Environment

Alternative 3 will be protective of human health and the environment by eliminating the VOC and CVOC concentrations present in subsurface soils above restricted residential criteria to a maximum depth of 20 ft and by eliminating constituents related to historic fill in landscaped/exposed soil areas. The potential for human and environmental exposure to these constituents on-site will be eliminated by the excavation of all soils above 15 ft (20 feet for CVOC hot spot areas) with parameters in excess of restricted residential criteria, disposing of excavated materials off-site and backfilling as needed with certified clean fill/topsoil. Although residual soil contamination below the water table and affected groundwater would not affect human health, chemical oxidant treatment would be expected to reduce contaminants in soil and improve groundwater quality further.

Potential post-remediation exposures to on-site residents from soil vapors would be addressed through the use of a vapor barrier and a SSDS beneath basement levels which are not required to be equipped with mechanical ventilation (parking garage). Post remedial exposures to off-site residents from soil vapors are possible though not expected. Off-site vapor impact will be addressed, if necessary, under OU2. Groundwater use will be restricted at the Site until groundwater quality recovers.

During remedial and construction activity workers and area residents may be exposed to impacted soil and vapors. Worker exposure to soil and vapors will be minimized through implementation of a HASP. Exposures to area residents from dust and/or vapors will be minimized through the use of engineering controls and through implementation of a CAMP.

3.3.2 Compliance with Remedial Goals, SCGs and RAOs

Alternative 3 will achieve compliance with the remedial goals, SCGs and RAOs for soil through source removal to restricted residential cleanup levels. SCGs for groundwater may not be achieved; however, bulk reduction in groundwater contamination will be realized and is consistent with the RAOs established for the Site. Compliance with SCGs for soil vapor is expected following completion of the remedial action.

3.3.3 Long-term Effectiveness and Permanence

Alternative 3 achieves long term effectiveness and permanence by permanently removing and/or remediating all soils to a maximum depth of 15 feet (20 feet for CVOC hot spot areas) which are affected by Site contaminants at concentrations above restricted residential objectives and by removing and replacing historic fill materials with constituents above restricted residential objectives from all future exposed soil areas. Bulk reductions in groundwater contamination as implemented under Alternative 3 will also be permanent. Under this Alternative, risks from soil impacts are eliminated for on-site residents and significantly reduced for off-site residents. Risks from groundwater impacts are also significantly reduced. Alternative 3 will continue to meet RAOs for soil and groundwater in the future, providing a permanent long-term solution for the Site.

3.3.4 Reduction in Toxicity, Mobility or Volume through Treatment

Alternative 3 will permanently eliminate the toxicity, mobility, and volume of contaminants from on-site soil by meeting restricted residential objectives for the top 15 ft of soil. The removal/remediation of on-site soil will also reduce the toxicity, mobility, and volume of contaminants within on-site soil vapor. Treatment of soil below the water table and groundwater will reduce the toxicity, mobility, and volume of contaminants in on-site groundwater.

3.3.5 Short-term Effectiveness

The potential for short-term adverse impacts and risks to the workers, the community, and the environment during the implementation of Alternative 3 is minimal.

Short-term exposure to on-site workers during excavation and loading activities will be addressed with a HASP and mitigated through the use of personal protective equipment, monitoring and engineering controls. Potential short-term exposure to the surrounding community will be addressed through the use of odor and dust-suppression techniques and through the implementation of a CAMP which will require air monitoring activities during all excavation and soil disturbance activities.

Other potential impacts to the community such as construction-related noise, vibrations and traffic will be controlled and regulated under the terms of the NYS Department of Buildings issued building permit which can place a Stop Work Order on the property for unsafe conditions, community impacts or violation of the terms and conditions of the permit. Decontamination procedures of equipment, including trucks transporting soil to off-site disposal facilities will

minimize the potential for impacted soil to be dispersed beyond the Site boundary. A truck traffic plan will also be prepared to minimize disturbance to the local roads and community.

3.3.6 Implementability

The techniques, materials and equipment to implement Alternative 3 are readily available and have been proven effective in remediating the contaminants associated with the Site. Excavation for the remediation of soils is both a "low tech" and reliable method which has a long and proven track record on the remediation of hazardous waste and petroleum spill sites.

Limiting the excavation to a typical construction depth of 15 to 20 ft does not represent any technical or administrative challenges. Since the excavation of hot spot areas will be performed using standard sloping techniques, areal expansion of the excavation will be straightforward and can proceed without further planning as conditions dictate. Oxidant injections to achieve bulk reductions in groundwater contamination will not be limited to a period of 5-years under Track 4.

3.3.7 Cost

Costs associated with Alternative 3 are estimated at approximately $1,700,000. This cost estimate includes the following elements and assumptions:

- Excavation of shallow hot-spot CVOC areas to a maximum depth of20 ft;
- Disposal of hotspot soils as a hazardous waste;
- Treatment of soil below 40 ft and groundwater using up to 70,000 pounds of oxidant;
- Vapor barrier and SSDS beneath new construction basement levels w/o garage;
- HASP and CAMP monitoring for the duration of the remedial activities.

3.3.8 Compatibility with Land Use

The proposed redevelopment of the Site is compatible with its current R5 residential zoning (with C2-3 commercial overlay). Following remediation, the Site will meet restricted residential use objectives which is appropriate for its planned multi-tenant residential use. A groundwater use restriction will be required to prevent future exposure to affected groundwater.

3.3.9 Community Acceptance

No questions regarding the Site have been raised regarding remedial options to date. This RAWP has been subject to a 45-day public comment period to determine if the community had any comments on the presented remedial alternatives and selected remedy. Since no comments were received regarding the Alternative remedy, it is considered to be acceptable to the community.

3.4 SELECTED REMEDIAL ALTERNATIVE

Remedial Alternative 3 was selected for the site since it adequately meets each of the evaluation criteria, and is more easily implemented than Alternatives 1 and 2.

Soil vapor at the Site is made up exclusively of CVOCs. Therefore remediation of CVOCs in soils must be a priority of the selected remedy. CVOCs in soil gas have been tied to high levels of CVOCs in several shallow soil "hot-spot" areas of the Site. All 3 Alternatives include excavation and disposal of soil in these areas, however, small isolated areas of CVOCs may remain and may not be identified. If present, even very small areas could continue to generate vapors which could impact on and off-site residents. Alternative 1 which contemplates a Track 1 cleanup scenario does not allow the long term operation of an engineering control to prevent impacts from media such as the operation of a SSDS. Although Alternative 2, as a Track 2 scenario, would allow the long term operation of an SSDS system, if a soil vapor extraction contingency were required, it would not be allowed under Track 2 since it would be considered a long term engineering control to meet objectives for soil.

Alternative 3 is protective of public health and the environment, complies with the appropriate restricted residential criteria for soil, provides long-term effectiveness and permanence through source removal and engineering and institutional controls, reduces the toxicity, mobility, or volume of impacted material through source removal, provides short-term effectiveness, including minimal impacts to workers and the community through the implementation of engineering controls during remedial activity, is readily implemented, can be implemented at a lower cost than Alternatives 1 and 2 and is compatible with land current zoning and future land use.

3.4.1 Preferred Remedy Land Use Factor Evaluation

As required by Article 27, Title 14 of the Environmental Conservation Law 27-1415, the following land use factor evaluation examines whether the preferred alternative is acceptable based on the 14 criteria presented in the following subsections.

3.4.2 Zoning

The proposed redevelopment project, which includes the construction of two multi-family apartment buildings, is in compliance with the current R5 residential zoning with a C2-3 commercial overlay. Therefore the project will be constructed as-of-right regardless of the alternative implemented. The preferred remedy will comply with current zoning.

3.4.3 Applicable Comprehensive Community Master Plans or Land Use Plans

The proposed redevelopment project and selected alternative is consistent with comprehensive master and land use plans, specifically the Kew Gardens-Richmond Hill rezoning action. This area-wide comprehensive re-zoning, completed by the New York City Department of City Planning and adopted by the City Council in March 2005, re-zoned the property from manufacturing to residential with a commercial overlay. The preferred remedy will comply with applicable land use plans.

3.4.4 Surrounding Property Uses

Land use surrounding the Site includes both commercial and residential areas. Commercial areas are largely clustered along Jamaica Avenue with residential areas adjacent to the commercial

strip. The remediation of the Site under the preferred alternative and the development of a residential building are consistent with the surrounding property uses.

3.4.5 Citizen Participation

Citizen participation for implementation of the preferred alternative will be performed in accordance with DER 23 and NYCRR Part 375-1.10 and Part 375-3.10.

3.4.6 Environmental Justice Concerns

No environmental justice concerns have been identified for this Site.

3.4.7 Land Use Designations

There are no federal or state land use designations pertaining to this Site. The preferred remedy will be consistent with land-use designations.

3.4.8 Population Growth Patterns

Population growth patterns support the proposed use for the Site. The preferred remedy will not negatively affect on population growth patterns.

3.4.9 Accessibility to Existing Infrastructure

The Site is accessible to existing infrastructure. The close proximity of the Site to Jamaica Avenue and the Van Wyck Expressway the Site will assist soil transportation and contractor access to the Site. The Site is also accessible to mass transit and is within walking distance to the Jamaica train station. The preferred remedy will not alter accessibility to existing infrastructure.

3.4.10 Proximity to Cultural Resources

The preferred remedy will not impact cultural resources

3.4.11 Proximity to Natural Resources

The preferred remedy will not affect natural resources other than to improve the quality of groundwater on a local basis.

3.4.12 Off-site Groundwater Impacts

On-site and off-site groundwater is impacted with CVOCs in excess of the NYSDEC Ambient Water Quality Objectives for groundwater. The selected alternative will remove the known sources of CVOC contamination on Site and treat groundwater with chemical oxidants to further improve both on-site and off-site groundwater quality. The selected alternative will therefore reduce the toxicity, mobility, and volume of contaminants in off-site groundwater.

3.4.13 Proximity to Floodplains

The Site is located more than one-half mile from the nearest floodplain.

3.4.14 Geography and Geology of the Site

The selected remedy will excavate shallow soil from the Site. Redevelopment will also remove soils to a depth of 15 feet for the basement levels of the new buildings. The selected alternative and development of the site have considered the geography and geology of the Site.

3.4.15 Current Institutional Controls

The Site was assigned E-designations for hazardous materials and noise as part of the rezoning action completed by the City. The compliance with the E-designation for hazardous materials will require the approval of the NYC Office of Environmental Remediation (NYCOER) of this RAWP. Compliance with the E-designation for Noise will require an alternate means of ventilation for each residential unit and noise attenuation steps to maintain an interior noise level of between 28 and 33 dBA under a closed window condition. NYCOER must approve this RAWP and the proposed noise mitigation steps in the form of a Notice to Proceed (NTP) letter before building permits will be released by the NYC Department of Buildings (DOB). Documentation in the form of a noise compliance report and a Final Engineering Report (FER) for site remediation must be approved by NYCOER in the form of a Notice of Satisfaction (NOS) before the NYCDOB will issue permanent Certificates of Occupancy for the new buildings.

3.5 SUMMARY OF SELECTED REMEDIAL ACTIONS

The Remedial Action will consist of the following remedial elements:

1. Excavation of the upper 15 to 20 ft of soil exceeding restricted residential in three identified CVOC hot-spot areas.
2. If additional PVOC or CVOC impacted soil is encountered in the hot-spot areas they will be expanded to remove all PVOC/CVOC impacted soil above restricted residential criteria in the upper 15 ft of the soil column. Additional excavation of CVOC impacted soil below restricted residential criteria will be performed to reduce CVOC's in soil gas. If residual petroleum, PVOC or CVOC affected soil is encountered during excavation of the basement areas, it will be segregated and classified for off-site disposal.
3. If post-excavation soil sampling demonstrates that the SCOs have not been met, additional excavation may be performed. See section 4.6.2 for further details regarding the post-excavation confirmation sampling.
4. Excavation and off-site disposal of historic fill materials above Restricted Residential SCOs within the top 2 feet of soil, if removed during construction excavation/site grading or if present in planned landscaped/exposed soil areas.
5. Screening for indications of contamination (by visual means, odor, and monitoring with PID) of all excavated soil during all intrusive site work.
6. Site Monitoring of airborne VOCs and particulates in accordance with a NYSDEC and NYSDOH approved CAMP and HASP during all intrusive and soil handling activities.

7. Implementation of proper dust and odor suppression techniques during all intrusive and soil handling activities. Appropriate off-site disposal of all material removed from the Site in accordance with all Federal, State and local rules and regulations for handling, transport, and disposal.
8. Import of materials to be used for backfill and cover in compliance with: (1) the Sub-part 375-6.7(d), (2) all Federal, State and local rules and regulations for handling and transport of material.
9. Collection and analysis of confirmation soil samples to evaluate the performance of the remedy with respect to attainment of restricted residential SCOs. See section 4.6.2 for further details regarding the post-excavation confirmation sampling.
10. Investigation and removal of drainage structures, surface drains and related piping and proper closure in accordance with the USEPA UIC regulations.
11. The injection of a chemical oxidant solution to remediate the contaminated groundwater beneath the site. Chemical oxidants will be injected through pvc injection points installed into the water table. Oxidant injection wells to be registered with the USEPA.
12. The collection and analysis of additional information as needed to finalize the design of the chemical oxidant injection program.
13. Installation of a vapor barrier and SSDS beneath all basement areas which will not be required to have continuous mechanical ventilation.
14. Post-remediation groundwater monitoring for a minimum of two years.
15. Post-remediation evaluation of potential soil vapor intrusion concerns.
16. Recording of an Environmental Easement, including Institutional Controls, to prevent future exposure to any residual contamination remaining at the Site.
17. Publication of a Site Management Plan for long term management of residual contamination as required by the Environmental Easement, including plans for: (1) Institutional and Engineering Controls, (2) monitoring, (3) operation and maintenance and (4) reporting.
18. All responsibilities associated with the Remedial Action, including permitting requirements and pretreatment requirements, will be addressed in accordance with all applicable Federal, State and local rules and regulations.
19. Remedial activities will be performed at the Site in accordance with this NYSDEC-approved RAWP.
20. All deviations from the RAWP will be promptly reported to NYSDEC for approval and fully explained in the FER.

4.0 REMEDIAL ACTION PROGRAM

The objective of this section of the Remedial Action Work Plan is to present a scope of work which will be approved by NYSDEC and when completely implemented, will ready the BCP site for development under the Contemplated Use, which is restricted residential use, consistent with the requirements of the Brownfield Cleanup Program. Additionally, following completion of the remedial activities and subject to any groundwater monitoring that may be required, it is an objective of this remedy that Clean Zones will be prepared beneath buildings, courtyards, parks, and utility corridors so that construction can be implemented without the need for OSHA Hazardous Waste Operations and Emergency Response ("HAZWOPER") training for construction workers.

4.1 GOVERNING DOCUMENTS

Governing documents and procedures included in the Remedial Work Plan include a Site-specific HASP, a CAMP, a Citizen Participation Plan (CPP), a Soil Management Plan (SMP) and analytical Quality Assurance Project Plan (QAPP). Highlights of these documents and procedures are provided in the following sections.

4.1.1 Health & Safety Plan (HASP)

The HASP takes into account the specific hazards inherent to the site and presents the minimum requirements which are to be met by the remediation contractor, EBC and its subcontractors, and other on-site personnel in order to avoid and, if necessary, protect against health and/or safety hazards. A HASP has been prepared for the remedial activity at the site and is provided in **Attachment B**.

Contractors and subcontractors will have the option of adopting this HASP or developing their own site-specific document. If a contractor or subcontractor chooses to prepare their own HASP, the Project Remedial Engineer will ensure that it meets the minimum requirements as detailed in the site HASP prepared by EBC and must be submitted to and approved by the NYSDEC.

4.1.2 Quality Assurance Project Plan (QAPP)

The fundamental QA objective with respect to accuracy, precision, and sensitivity of analysis for laboratory analytical data is to achieve the QC acceptance of the analytical protocol. The accuracy, precision and completeness requirements will be addressed by the laboratory for all data generated.

Collected samples will be appropriately packaged, placed in coolers and shipped via overnight courier or delivered directly to the analytical laboratory by field personnel. Samples will be containerized in appropriate laboratory provided glassware and shipped in plastic coolers. Samples will be preserved through the use of ice or cold-pak(s) to maintain a temperature of 4^{o}C.

Dedicated disposable sampling materials will be used for both soil and groundwater samples, eliminating the need to prepare field equipment (rinsate) blanks. However, if non-disposable

equipment is used, (stainless steel scoop, etc.) field rinsate blanks will be prepared at the rate of 1 for every eight samples collected.

Decontamination of non-dedicated sampling equipment will consist of the following:

- Gently tap or scrape to remove adhered soil;
- Rinse with tap water;
- Wash with alconox® detergent solution and scrub ;
- Rinse with tap water;
- Rinse with distilled or deionized water.

Prepare field blanks by pouring distilled or deionized water over decontaminated equipment and collecting the water in laboratory provided containers. Trip blanks will accompany samples each time they are transported to the laboratory. Matrix spike and matrix spike duplicates (MS/MSD) will be collected at the rate of one per 20 samples submitted to the laboratory. Laboratory reports will be upgradeable to ASP category B deliverables for use in the preparation of a data usability report (DUSR). The DUSR will be applicable to all confirmation samples and final round samples. Performance monitoring samples will be in a results-only format. The QAPP prepared for the Site is provided in **Attachment C**.

4.1.3 Soil Management Plan (SMP)

An SMP was prepared for excavation, handling, storage, transport and disposal of all soils/materials that are disturbed/excavated at the Site. The SMP includes all of the controls that will be applied to these efforts to assure effective, nuisance-free performance in compliance with all applicable Federal, State and local laws and regulations. The SMP developed for this site is presented in **Section 4.5** of this RAWP.

4.1.4 Community Air Monitoring Plan (CAMP)

The CAMP provides measures for protection for on-site workers and the downwind community (i.e., off-site receptors including residences, businesses, and on-site workers not directly involved in the remedial work) from potential airborne contaminant releases resulting from remedial activities.

The action levels specified require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that the remedial work did not spread contamination off-site through the air.

The primary concerns for this site are vapors, nuisance odors and dust particulates. A CAMP was previously prepared for implementation of the RAWP and is provided in **Attachment D**.

4.1.5 Citizen Participation Plan (CPP)

The approved CPP for this project requires the distribution of fact sheets at key stages of the project to area residents and other parties as identified in a site contact list included in the CPP.

A certification of mailing will be sent by the Volunteer to the NYSDEC Project Manager following the distribution of all Fact Sheets and notices that includes:

1) Certification that the Fact Sheets were mailed;
2) The date they were mailed;
3) A copy of the Fact Sheet;
4) A list of recipients (contact list); and
5) A statement that the repository was inspected on (specific date) and that it contained all of applicable project documents.

No changes will be made to approved Fact Sheets authorized for release by NYSDEC without written consent of the NYSDEC. No other information, such as brochures and flyers, will be included with the Fact Sheet mailing.

A document repository has been established at the following location and contains all applicable project documents:

Queens Borough Public Library
Richmond Hill Branch
118-14 Hillside Avenue
Richmond Hill, New York 11418
Contact: Alice Norris
(718) 849-7150

4.2 GENERAL INFORMATION

4.2.1 Project Organization

The Project Manager for the Remedial Activity will be Mr. Kevin Brussee. Overall responsibility for the BCP project will be Mr. Charles B. Sosik, P.G., P.HG. The Remedial Engineer for the project is Mr. Ariel Czemerinski, P.E. The Owner's representative in charge of the redevelopment project is Mr. Daniel Moritz. The Construction Manager for site preparation and the redevelopment project is Mr. Richard Powers. The owner's representative for budgeting, scheduling and work quality for the redevelopment project is Mr. Robert Scarpa, Jr, RA.

Resumes of key personnel involved in the Remedial Action are included in **Attachment E**.

4.2.2 Remedial Engineer

The Remedial Engineer for this project will be Mr. Ariel Czemerinski, P.E.. The Remedial Engineer is a registered professional engineer licensed by the State of New York. The Remedial Engineer will have primary direct responsibility for implementation of the remedial program for the Site. The Remedial Engineer will certify in the Final Engineering Report that the remedial activities were observed by qualified environmental professionals under his supervision and that the remediation requirements set forth in the Remedial Action Work Plan and any other relevant provisions of ECL 27-1419 have been achieved in conformance with that Plan.

The Remedial Engineer will coordinate the work of other contractors and subcontractors involved in all aspects of remedial construction, including soil excavation, stockpiling, characterization, removal and disposal, air monitoring, emergency spill response services, import of back fill material, and management of waste transport and disposal.

The Remedial Engineer will review all pre-remedial plans submitted by contractors for compliance with this Remedial Action Work Plan.

4.2.3 Remedial Action Schedule

The estimated duration of the excavation and soil handling activity is eight to sixteen weeks. The remedial action includes continuation of the injection of chemical oxidants into the groundwater. Site restoration and the installation of sub-slab venting systems will be performed as per the redevelopment plans for the site.

4.2.4 Work Hours

The hours for operation of remedial construction will conform to the NYCDOB construction code requirements or according to specific variances issued by that agency. DEC will be notified by the Applicant of any variances issued by the NYCDOB.

4.2.5 Site Security

The Site currently has chain link fences on three sides, east, west and north. The fourth side, south along Jamaica Avenue is bordered by the existing building. Prior to building demolition, a new fence will be erected along the Jamaica Avenue sidewalk and tied into the other fences to completely surround the property and restrict access by the public. This fence will be maintained during remedial and construction activity and properly secured at the end of the day.

4.2.6 Traffic Control

All traffic enters and leaves the Site via the existing gate on Jamaica Avenue. The Volunteer's construction management personnel will direct the arrival or departure of construction vehicles, and provide flag services as needed to maintain safe travel exiting and entering the site from Jamaica avenue. Traffic related to on-going remedial activity will require the staging of 10-wheel dump trucks along Jamaica Avenue on a daily basis during soil excavation activity. The complete soil disposal transport route(s) will be identified following the selection of an off-site disposal facility and will be submitted to DEC prior to the shipment of soils off-site. The routes will be designed to minimize or eliminate the time trucks will be on local streets. Clean, empty trucks waiting to be loaded will be parked along Jamaica Avenue and not on Neighborhood Streets. Site personnel will be required to park on Site or in legal all-day on-street parking spaces, along Jamaica Avenue.

4.2.7 NYSDEC BCP Signage

A project sign will be erected at the main entrance to the Site prior to the start of remedial activities. The sign will indicate that the project is being performed under the New York State

Brownfield Cleanup Program. The sign will meet the detailed specifications as shown in **Attachment F**.

4.3 REPORTING

4.3.1 Daily Reports

Daily reports will be submitted to NYSDEC and NYSDOH Project Managers by the end of each day in which remedial activity takes place. Daily reports will include:

- An update of progress made during the reporting day;
- Locations of work and quantities of material imported and exported from the Site;
- References to alpha-numeric map for Site activities;
- Quantities of oxidant material applied at specific injection locations of the Site;
- A summary of any and all complaints with relevant details (names, phone numbers);
- A summary of CAMP readings;
- An explanation of notable Site conditions.

Daily reports are not intended to be the mode of communication for notification to the NYSDEC of emergencies (accident, spill), requests for changes to the RAWP or other sensitive or time critical information. However, such conditions must also be included in the daily reports. Emergency conditions and changes to the RAWP will be addressed directly to the NYSDEC Project Manager via personal communication. These reports will include a summary of air sampling results, odor and dust problems and corrective actions, and all complaints received from the public.

4.3.2 Monthly Reports

Monthly reports will be submitted to NYSDEC and NYSDOH Project Managers within one week following the end of the month of the reporting period 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. tons of 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.

4.3.3 Other Reporting

Photographs will be taken of all remedial activities and submitted to NYSDEC and NYSDOH in digital (JPEG) format in the Final Engineering Report (FER). Photos will illustrate all remedial program elements and will be of acceptable quality. Representative photos of the Site prior to

any Remedial Actions will be provided. Representative photos will be provided of each contaminant source, source area and Site structures before, during and after remediation. CD's will have a label and a general file inventory structure that separates photos into directories and sub-directories according to logical Remedial Action components. A photo log keyed to photo file ID numbers will be prepared to provide explanation for all representative photos. For larger and longer projects, photos should be submitted on a monthly basis or another agreed upon time interval. 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.

4.3.4 Complaint Management Plan

Complaints from the public regarding nuisance or other Site conditions including noise, odor, truck traffic etc., will be recorded in the Site field book and reported to the NYSDEC in the daily status report.

4.3.5 Deviations from the Remedial Action Work Plan

Minor deviations from the RAWP will be identified in the daily update report and will be noted in the Final Engineering Report. When deviations are reported, a brief discussion will be provided which will state the following:

- Reasons for deviating from the approved RAWP;
- Effect of the deviations on overall remedy.

Major changes to the scope of work must be discussed with the NYSDEC and the NYSDOH prior to implementation. If the changes are considered to be significant enough, an addendum to the RAWP Work Plan will be prepared and submitted to NYSDEC/NYSDOH for review.

4.4 MOBILIZATION

Mobilization will include the delivery of construction equipment and materials to the site. All construction personnel will receive site orientation and training in accordance with the site specific HASP, CAMP and established policies and procedures to be followed during the implementation of the RAWP. The remediation contractor, construction manager and all associated subcontractors will each receive a copy of the RAWP and the site specific HASP and will be briefed on their contents.

4.5 REMOVAL / REMEDIATION OF DRAINGE STRUCTURES

Prior to removal and remediation of the drainage structures the UIC Director of the United States Environmental Protection Agency (USEPA) will be notified of the owners intent to close the wells in accordance with Title 40 of the Code of Federal Regulations (40 CFR) Section 144.12(a).

An Environmental Remediation Contractor will remove the standing water from each structure utilizing a liquids pump truck. The structures to be closed/removed include: DW1, DW2, and

DW3, the four overflow pools connected to DW1 and DW2, and the two overflow pools connected to DW3. Waste characterization liquid samples will be collected from the structures to obtain approval for disposal of the liquid at a licensed TSDF.

A Guzzler® or Vactor® truck will then be utilized to remove sediment/sludge from the base of each drywell and overflow pool (structures) until at least the base of the bottom of the deepest pre-cast concrete ring is exposed. Waste characterization sediment/soil samples will be collected from each of the structures prior to remediation to obtain waste disposal approval into a licensed TSDF prior to starting work. Sediment sampling conducted by EBC in September 2010, as part of the supplemental investigation did not note any elevated VOC contaminants in sediments within the structures nor any SVOCs or metals (except copper) above restricted residential objectives. Therefore, end point soil samples will not be collected unless evidence of contamination is noted during remediation.

Following remediation, each precast concrete structure will be removed from the ground. It will likely be necessary to remove soil from immediately surrounding the structures to facilitate removal. Subsurface soil from around each structure will then be excavated and stockpiled according to field screening observations. Historic fill and/or RCA will be stockpiled on 6-mil polyethylene sheeting for characterization/disposal as described in **Section 4.6.3**. Any soil that exhibits olfactory evidence of contamination (staining, odor, sheen, PID response, etc.) will be stockpiled separately on and under 6-mil polyethylene sheeting for characterization (if required by disposal facility). No native soils are expected to be encountered during removal of the structures.

Once a structure has been exposed enough to allow for unobstructed removal and minimal/no excavation cave-in, the pre-cast concrete lid will be removed as one piece (if possible) utilizing an excavator and hoisting straps/chains. Following removal of the lid/cap, each 4 foot pre-cast concrete ring will be lifted from the ground and set aside (if possible). If a concrete ring(s) could not be removed as a single unit, an excavator equipped with a hydraulic hammer (if necessary) will be utilized to break the pre-cast concrete ring within the ground into pieces that can be removed from the excavation by the excavator bucket. All concrete from the structures will be broken into pieces no larger than 4ft in diameter and stockpiled for disposal as construction and demolition debris.

The removal and remediation of the drywell and overflow pool structures will be performed by a qualified remedial contractor and fully trained personnel (40HR OSHA HAZWOPER).

4.6 SOIL MANAGEMENT PLAN

4.6.1 Excavation of Hot Spot Areas

Three CVOC hot-spot areas have been identified at the Site as shown on **Figure 7**. The areas include two adjacent areas along the drainage system line in the east parking area. The first area is related to a distribution box into which lines extend to leaching pool DW1, the rear of the Site and the building converge. The second hot-spot area is located at a repair in the line which extends from the distribution box to leaching pool DW1. Based on soil borings installed around these areas during the supplemental investigation, contamination does not extend more than 20 ft

from the point source and not more than 15 ft in depth. The third hot-spot area is located adjacent to the central tank area and extends under the existing building. The third area extends from boring B13 installed by ELM during the RI to VSB3 installed by Vertex. The CVOC contamination reported in this area ranges from 0-4 ft to 18 ft in depth, but does not exceed restricted residential criteria. The CVOC contamination associated with the distribution box and drain line exceeds restricted residential objectives. These hot-spot areas will be excavated to remove CVOC impacted soils. Excavated soil will be secured and temporarily stored on-site until arrangements can be made for off-site disposal. As an alternative, pre-characterization samples may be collected to allow the soil to be loaded directly on to trucks for transport to the disposal facility. It is anticipated that soils excavated from the hot-spot areas will be classified as a hazardous waste. The final determination on classification will be based on the results of waste characterization analysis and consultation with the NYSDEC.

Soil excavation will be performed in accordance with the procedures described under Section 5.5 of DER-10 as follows:

- A description and photographic documentation of the excavation.
- Examination of the excavation floor and sidewalls for physical evidence of contamination (odor, staining, sheen, etc.).
- Periodic field screening (through bucket return) of the floor and sidewalls of the excavation with a calibrated photoionization detector (PID).

Final excavation depth, length, and width will be determined by EBC personnel supervising the work, and will depend on the horizontal and vertical extent of contaminated soils as identified through physical examination (PID response, odor, staining, etc.). Expansion of the excavation beyond the planned hotspot area is anticipated and can easily be accommodated.

The following procedure will be used for the excavation of impacted soil (as necessary and appropriate):

- Wear appropriate health and safety equipment as outlined in the HASP;

- Prior to excavation, ensure that the area is clear of utility lines or other obstructions. Lay plastic sheeting on the ground next to the area to be excavated;

- Using a rubber-tired backhoe or track mounted excavator, remove overburden soils and stockpile or dispose of separate from the impacted soil;

- If USTs are discovered, the NYSDEC will be notified and the best course of action to remove the structure should be determined in the field. This may involve the continued removal of overburden to access the top of the structure or continued trenching around the perimeter to minimize its disturbance;

- If physically contaminated soil is present (e.g., staining, odors, sheen, PID response, etc), an attempt will be made to remove it to the extent not limited by the site boundaries. If possible, physically impacted soil will be removed using the backhoe or excavator, segregated from clean soils and overburden, and staged on separate dedicated plastic

sheeting or live loaded into trucks from the disposal facility. Removal of the impacted soils will continue until visibly clean material is encountered and monitoring instruments indicate that no contaminants are present;

- Excavated soils which are temporarily stockpiled on-site will be covered with 6-mil polyethylene sheeting while disposal options are determined. Sheeting will be checked on a daily basis and replaced, repaired or adjusted as needed to provide full coverage. The sheeting will be shaped and secured in such a manner as to drain runoff and direct it toward the interior of the property;

- Once the EBC site representative and regulatory personnel are satisfied with the removal effort, verification or confirmatory samples will be collected from the excavation as described in **Section 4.6.2** of this document.

The excavation of hot-spot areas will be performed by a qualified remedial contractor and fully trained personnel (40HR OSHA HAZWOPER).

4.6.2 Post Excavation Confirmation Sampling

Post excavation soil samples will be collected from each hot-spot excavation area to verify that remedial goals have been achieved. Verification samples will be submitted to a NYSDOH certified analytical laboratory for analysis of VOCs according to EPA method 8260 with category B deliverables.

4.6.2.1 Confirmation Sampling Frequency
Confirmation samples will be collected at a frequency as outlined in DER-10 as follows:

If impacted soil is encountered and removed to the extent practical, a minimum of five samples will be collected consisting of 4 sidewall samples (minimum of 1 per 30 liner feet of sidewall) and one bottom sample (minimum of 1 sample per 900 squre feet. Samples will be biased upon field screening to the suspected location of greatest contamination.

4.6.2.2 Reporting of Results
Sample analysis will be provided by a New York State certified environmental laboratory. Laboratory reports will include ASP category B deliverables for use in the preparation of a data usability summary report (DUSR).

4.6.2.3 QA/QC
The fundamental QA objective with respect to accuracy, precision, and sensitivity of analysis for laboratory analytical data is to achieve the QC acceptance of the analytical protocol. The accuracy, precision and completeness requirements will be addressed by the laboratory for all data generated.

Collected samples will be appropriately packaged, placed in coolers and shipped via overnight courier or delivered directly to the analytical laboratory by field personnel. Samples will be containerized in appropriate laboratory provided glassware and shipped in plastic coolers. Samples will be preserved through the use of ice or cold-paks to maintain a temperature of 4^{o}C.

Dedicated disposable sampling materials will be used for sample collection, eliminating the need to prepare field equipment (rinsate) blanks. However, if non-disposable equipment is used, (stainless steel scoop, etc.) field rinsate blanks will be prepared at the rate of 1 for every eight samples collected.

Decontamination of non-dedicated sampling equipment will consist of the following:

- Gently tap or scrape to remove adhered soil;
- Rinse with tap water;
- Wash with alconox® detergent solution and scrub ;
- Rinse with tap water;
- Rinse with distilled or deionized water;

Prepare field blanks by poring distilled or deionized water over decontaminated equipment and collecting the water in laboratory provided containers.

4.6.2.4 DUSR

The DUSR provides a thorough evaluation of analytical data without third party data validation. The primary objective of a DUSR is to determine whether or not the data, as presented, meets the site/project specific criteria for data quality and data use. Verification and/or performance monitoring samples collected under this IRM will be reviewed and evaluated in accordance with the Guidance for the Development of Data Usability Summary Reports as presented in Appendix 2B of DER-10. The completed DUSR for verification/performance samples collected during implementation of this RAWP will be included in the final Engineering Report.

4.6.3 Excavation of Historic Fill Materials

Historic fill has been identified throughout most of the site. The depth varies from 6 inches to approximately 2 ft. The fill material contains several SVOCs and metals including Barium, Chromium, Copper, Lead and Zinc above unrestricted objectives. Barium, Copper and Lead were also reported above restricted residential objectives in some areas. Historic fill which is present in areas of the site which are scheduled for the excavation of basement levels or which will otherwise be disturbed through grading or other activities, will be segregated from non-contaminated native soils and disposed of off-site at a permitted disposal facility. Excavated historic fill materials will be secured and temporarily stored on-site until arrangements can be made for off-site disposal. As an alternative, pre-characterization samples may be collected to allow the soil to be loaded directly on to trucks for transport to the disposal facility. It is anticipated that historic fill materials will be classified as a non-hazardous material. It is anticipated that the excavation of historic fill materials will be performed by the excavation contractor for the construction project.

4.6.4 Excavation of Native Soils

Native soils are present directly below the fill materials and will represent the majority of soils excavated from the basement areas during construction of the new building. Since excavation of the basement areas will begin following removal of the hot spot areas, it is expected that native soils will not be contaminated. However, if pockets of contamination are discovered beneath the existing building's foundation following demolition, or during the excavation of basement areas,

the contamination will be removed to the extent possible and segregated from clean native soils for proper disposal. Clean native soils will be stockpiled on-site and characterized for off-site disposal. It is anticipated that clean native soil will be disposed of as a beneficial re-use material. Clean native soils may also be utilized for backfill at the site provided that they pass a testing program and that reuse on-site is approved by the NYSDEC.

It is anticipated that the excavation of native soil materials will be performed by the excavation contractor for the construction project.

4.6.5 Soil Screening Methods

Visual, olfactory, soil screening and assessment will be performed by a qualified environmental professional (QEP) during all remedial and development excavations into known or potentially contaminated material. Soil screening will be performed 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 the COC. Soil screening will include physical observation for odors and staining of soils and bedrock materials and scanning with a photoionization detector.

Resumes will be provided for all personnel responsible for field screening (i.e. those representing the Remedial Engineer) of invasive work for unknown contaminant sources during remediation and development work.

4.6.6 Stockpile Methods

Materials excavated from hot spot contaminated areas excavated materials may be stockpiled for characterization prior to off-site disposal or, if pre-characterized, loaded directly into trucks supplied by the selected disposal facility.

If stockpiling of overburden soil is utilized then the following methods will apply. Stockpiles will be inspected every work day and after every storm event. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by NYSDEC. Stockpiles will be kept covered at all times with appropriately anchored commercial-grade tarps. Stockpiles will be routinely inspected and damaged tarp covers will be promptly replaced. Hay bales will be used as needed near catch basins, surface waters and other discharge points.

4.6.7 Materials Excavation and Load Out

The Remediation Engineer or a QEP under his/her supervision will oversee all invasive work and the excavation and load-out of all excavated material. Loaded vehicles leaving the Site will be appropriately lined, tarped, securely covered, manifested, and placarded in accordance with appropriate Federal, State, local, and NYSDOT requirements (and all other applicable transportation requirements).

Where effective, the equipment will be “dry” decontaminated using a broom and/or brushes. If significant amounts of soil or other contaminants remain after the dry decontamination, the equipment will also be pressure washed before leaving the Site. The QEP will be responsible for

ensuring that all outbound trucks are dry-brushed or washed on the truck wash/equipment pad before leaving the Site until the remedial construction is complete. Locations where vehicles enter or exit the Site shall be inspected daily for evidence of off-Site sediment tracking. The QEP will be responsible for ensuring that all egress points for truck and equipment transport from the Site will be clean of dirt and other materials derived from the Site during Site remediation and development. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to Site derived materials.

Each hot-spot and structure to be remediated (leaching pool, vaults and associated piping) will be removed and confirmation sampling completed before excavations related to Site development commence proximal to the hot-spot or structure.

Development related grading cuts and fills will not interfere with, or otherwise impair or compromise, the performance of remediation required by this plan. Mechanical processing of historical fill and contaminated soil on-Site is prohibited.

4.6.8 Materials Transport Off-Site

All transport of materials will be performed by licensed haulers in accordance with appropriate local, State, and Federal regulations, including 6 NYCRR Part 364. Haulers will be appropriately licensed and trucks properly placarded. Once final disposal arrangements have been made with the receiving facility(ies), truck transport routes will be prepared. All trucks loaded with Site materials will exit the vicinity of the Site using only these approved truck routes.

Proposed in-bound and out-bound truck routes will take into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c) prohibiting off- Site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport. Trucks will be prohibited from stopping and idling in the neighborhood outside the project Site.

Egress points for truck and equipment transport from the Site will be kept clean of dirt and other materials during Site remediation and development. Material transported by trucks exiting the site will be secured with covers.

If loads contain wet material capable of producing free liquid, truck liners will be used. All trucks will be inspected and dry-brushed, as needed, before leaving the site. If powerwashing is used, truck wash waters will be collected and disposed of off-Site in an appropriate manner.

4.6.9 Materials Disposal Off-Site

Multiple disposal facility designations will be employed for the materials removed from the Site. Once final arrangements have been made the disposal location(s) will be reported to the NYSDEC Project Manager.

The total quantity of hot-spot soils expected to be disposed off-Site is 944 cubic yards. In addition approximately 1,500 cubic yards of historic fill will be disposed of off-site and 19,000

cubic yards of non-contaminated native soil will be excavated for the below grade parking garage.

All hot-spot soils and historic fill excavated and removed from the Site will be treated as contaminated and regulated material and will be disposed of in accordance with all local, State (including 6NYCRR Part 360) and Federal regulations. It is anticipated that hot-spot soils will be disposed of as a hazardous waste and historic fill disposed of as a non-hazardous material. Petroleum contaminated soils, if encountered, and which are free of CVOCs will also be disposed of as a non-hazardous material. Final classification of excavated materials will be dependant upon the results of waste characterization sampling and the NYSDEC. Waste characterization will be performed for off-Site disposal in a manner suitable to the receiving facility and in conformance with applicable permits. Sampling and analytical methods, sampling frequency, analytical results and QA/QC will be reported in the FER. All data available for soil/material to be disposed at a given facility must be submitted to the disposal facility with suitable explanation prior to shipment and receipt.

Hazardous wastes derived from on-Site will be stored, transported, and disposed of in full compliance with applicable local, State, and Federal regulations. Appropriately licensed haulers will be used for material removed from this Site and will be in full compliance with all applicable local, State and Federal regulations.

Non-hazardous historic fill and contaminated soils taken off-Site will be handled, at minimum, as a Municipal Solid Waste per 6NYCRR Part 360-1.2. Historical fill and contaminated soils from the Site are prohibited from being disposed at Part 360-16 Registration Facilities (also known as Soil Recycling Facilities). Soils that are contaminated but non-hazardous and are being removed from the Site are considered by the Division of Solid & Hazardous Materials (DSHM) in NYSDEC to be Construction and Demolition (C/D) materials with contamination not typical of virgin soils. These soils may be sent to a permitted Part 360 landfill. They may be sent to a permitted C/D processing facility without permit modifications only upon prior notification of NYSDEC. This material is prohibited from being sent or redirected to a Part 360-16 Registration Facility. In this case, as dictated by DSHM, special procedures will include, at a minimum, a letter to the C/D facility that provides a detailed explanation that the material is derived from a DER remediation Site, that the soil material is contaminated and that it must not be redirected to on-Site or off-Site Soil Recycling Facilities. The letter will provide the project identity and the name and phone number of the Consultant. The letter will include as an attachment a summary of all chemical data for the material being transported.

Clean soil removed from the site for development purposes (i.e. basement levels) will be handled as unregulated or beneficial use disposal. This soil will undergo a testing program to confirm that it meets Track 1 unrestricted SCOs prior to unregulated disposal or reuse on-site. Confirmation testing of clean soils will be as follows:

Analysis	**Frequency**	**Sample Type**
SVOCs, Pest/PCBs, Metals	1/1,000 cy	Composite of 7-point grab
VOCs	1/500 cy	Composite of 7-point grab

Uncontaminated native soil confirmed by the above testing program and removed from the site, will be disposed of as unregulated C&D material or sent to a beneficial re-use facility. The final destination of soils whether classified as contaminated or uncontaminated must be approved by the NYSDEC.

Concrete demolition material generated on the Site from building slabs, parking areas and other structures will be segregated, sized and shipped to a concrete recycling facility. Concrete crushing or processing on-Site is prohibited. Asphalt removed from the parking areas will be sent to a separate recycling facility.

Additionally, it is common to encounter scrap metals and large boulders (greater than one foot in diameter) during excavation which may not be accepted by either the licensed disposal facility or the C&D facility. These materials will be segregated and subsequently recycled at local facilities. Uncontaminated metal objects will be taken to a local scrap metal facility.

The following documentation will be obtained and reported to DEC for each disposal location used for contaminated material to fully demonstrate and document that the disposal of material derived from the Site conforms with all applicable laws: (1) a letter from the Consultant to the receiving facility describing the material to be disposed and requesting formal written acceptance of the material. This letter will state that material to be disposed of was generated at an environmental remediation site in New York State. The letter will provide the project identity and the name and phone number of the Consultant. The letter will include as an attachment a summary of all chemical data for the material being transported; and (2) a letter from all receiving facilities stating it is in receipt of the correspondence (above) and is approved to accept the material. These documents will be included in the FER.

Bill of Lading system or equivalent will be used for off-Site movement of non-hazardous wastes and contaminated soils. This information will be reported in the Final Engineering Report.

Documentation for materials disposed of at recycling facilities (such as metal, concrete, asphalt) and as non-regulated C&D will include transport tickets for each load stating the origin of the material, the destination of the material and the quantity transported.

The RAWP activities will be summarized in the FER. The summary will include an accounting of the destination of all material removed from the Site during this Remedial Action, including excavated soil, contaminated soil, historic fill, solid waste, and hazardous waste, non-regulated material, and fluids. Documentation associated with disposal of all material must also include records and approvals for receipt of the material. This information will also be presented in a tabular form in the FER.

4.6.10 Materials Reuse On-Site

There is no plan to re-use any site materials on the property, however, clean native soil may be used to backfill around foundation walls and to backfill the hot-spot excavation areas. Re-use of on-Site clean native soil will only be allowed if the material is found to meet restricted residential criteria through the verification testing program detailed above. The Remedial

Engineer will ensure that procedures defined for materials reuse in this RAWP are followed and that unacceptable material will not remain on-Site.

Concrete crushing or processing on-Site is prohibited. Organic matter (wood, roots, stumps, etc.) or other solid waste derived from clearing and grubbing of the Site is prohibited for reuse on-Site. Contaminated on-Site material, including historic fill and contaminated soil, removed for grading or other purposes will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines.

4.6.11 Backfill from Off-Site Sources

Off-site fill material may be needed to stabilize the entrance - exit areas of the Site and for temporary driveways for loading trucks. Clean fill will also be imported onto the Site as necessary for foundation sub-base.

Recycled materials such as concrete, may be used for temporary truck ramps provided that the material is to be removed from the Site at the conclusion of the project and that the material is tested for and found to be free of asbestos prior to delivery to the Site. Sampling for asbestos shall be one sample per 250 cy.

Fill material destined for future non-exposed areas will consist of virgin mined sand, gravel or stone products. Under no circumstances will recycled materials be used. Materials from a virgin mined source may be imported to the Site without testing provided that that the material meets the specifications of the geotechnical engineer, Remedial Engineer, and Redevelopment Construction Documents and that the source of the material is approved by the Remediation Engineer and the NYSDEC Project Manager.

The source approval process will require a review of the following information:

- The origin of the material;
- The address of the facility which mines/processes the material;
- A letter from the facility stating that the material to be delivered to the site is a virgin mined material and that it has not been co-mingled with other materials during processing or stockpiling.

Fill or topsoil used in landscaped, green or exposed soil areas will meet restricted residential SCOs. The fill or topsoil must be tested prior to delivery to the Site at the rate of one sample for every 250 cubic yards. Sample analysis will include target compound list (TCL) VOCs, TCL SVOCs, PCBs, Pesticides and target analyte list (TAL) metals.

All materials proposed for import onto the Site will be approved by the Remedial Engineer and will be in compliance with provisions in this RAWP prior to receipt at the Site. Material from industrial sites, spill sites, other environmental remediation sites or other potentially contaminated sites will not be imported to the Site.

All imported soils will meet NYSDEC approved backfill or cover soil quality objectives for this Site. The NYSDEC approved backfill or cover soil quality objectives are the restricted

residential cleanup objectives as listed in 6 NYCRR Part 375-6. Non-compliant soils will not be imported onto the Site without prior approval by NYSDEC. Nothing in the approved RAWP or its approval by NYSDEC should be construed as an approval for this purpose.

Fill and stone materials which can be certified as virgin mined material will not require testing assuming adequate documentation is obtained and submitted to the NYSDEC for approval. Under no circumstances will fill materials be imported to the site without prior approval from the NYSDEC Project Manager. If sufficient documentation is not obtained, fill materials will be tested at the minimum rate of one sample for the initial 500 cubic yards and every 1,000 cubic yards thereafter. Sample analysis will include TCL VOCs, TCL SVOCs, PCBs, Pesticides and TAL metals. Soils that meet 'exempt' fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this Site, will not be imported onto the Site without prior approval by NYSDEC. Nothing in this Remedial Action Work Plan should be construed as an approval for this purpose. Solid waste will not be imported onto the Site.

4.6.12 Community Air Monitoring Plan

The CAMP provides measures for protection for the downwind community (i.e., off-site receptors including residences, businesses, and on-site workers not directly involved in the remedial work) from potential airborne contaminant releases resulting from remedial activities at construction sites.

The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that the remedial work did not spread contamination off-site through the air. The primary concerns for this site are nuisance odors and dust particulates.

Exceedances observed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers and included in the Daily Report. The complete CAMP developed for this site is included in **Attachment D** of this RAWP.

4.6.13 Odor, Dust and Nuisance Control Plan

4.6.13.1 Odor Control Plan
This odor control plan is capable of controlling emissions of nuisance odors off-Site. If nuisance odors are identified, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of all other complaints about the project.

All necessary means will be employed to prevent on- and off-Site 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) using foams to cover exposed odorous soils; . If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-Site disposal; (e) use of chemical odorants in spray or misting systems; and, (f) use of staff to monitor odors in surrounding neighborhoods.

4.6.13.2 Dust Control Plan
A dust suppression plan that addresses dust management during invasive on-Site work will include, at a minimum, the items listed below:

- Dust suppression will be achieved though the use of wetting.
- Gravel will be used on roadways to provide a clean and dust-free road surface.
- On-Site roads will be limited in total area to minimize the area required for water spraying.

4.6.13.3 Other Nuisances
A plan for rodent control will be developed and utilized by the contractor prior to and during Site demolition and clearing, and during all remedial work. A plan will be developed and utilized by the contractor for all remedial work and will conform, at a minimum, to NYCDEP noise control standards.

4.7 CHEMICAL OXIDANT INJECTION PROGRAM

This RAWP includes the injection of a chemical oxidant solution to address affected groundwater and residual PVOC contamination at the water table as identified during the Remedial Investigation. Chemical oxidant injection is intended to significantly reduce the CVOCs and PVOCs in the high concentration areas, and thereby accelerate the improvements in groundwater quality.

The proposed area of injection is within, and upgradient of, the former central UST area which was the primary source of PVOC contamination at the Site (**Figure 8**). Injections at this location will deliver oxidant through residual soil contamination in this area, allowing it to flow southwest with groundwater treating the CVOC and PVOC plume. A second injection area is located approximately 150 ft southwest of the central tank area and is designed to treat the downgradient portion of the plume. Both injection areas are located outside of the planned Phase II building footprint, allowing injections to proceed during and after building construction as necessary.

Injection frequency, concentration and volume will be dictated by calculated chemical oxidant demand, site conditions and manufacturer's recommendations. Specifics regarding the chemical oxidant injection program will be developed following the collection of additional field/laboratory data including one or more of the following: natural soil oxidant demand sampling and analysis, aquifer parameter testing and laboratory bench top studies or field pilot testing. This testing will be performed and summarized in a report to DEC prior to implementation of the oxidant injection program.

4.7.1 Injection Well Installation

Approximately 22 injection points will be installed upgradient of the primary source areas and in the downgradient plume area as shown on **Figure 8**. Injection points will be constructed of 2 inch pvc with a 10 ft 0.050-inch slot screened section installed 8 ft below the water table, and 2 ft above the water table. A No. 2 morie gravel back will be placed around the screen to a depth of

approximately 1 ft above the screen followed by a 1 ft hydrated bentonite pellet seal. The injection wells will be finished as needed to protect the well during construction.

Injection wells will be registered with the USEPA by filing form 7520-6 with the USEPA Region 2 office.

4.7.2 Oxidant Injection Events

The oxidant selected for this project is high pH-activated sodium persulfate. Sodium persulfate is a robust oxidant which has a long residence time (anion lifetime) in the subsurface. Persulfate activation through high pH provides fast contaminant reaction kinetics capable of destroying a wide range of organics including the PVOCs and CVOCs present at the Site.

Sodium persulfate will be delivered to the site as a dry powder which will be mixed with water on-site to provide a 20% solution. Sodium hydroxide (NaOH) will be delivered to the site as a 25% solution and added to the persulfate solution at a rate of 0.4 gallons of 25% NaOH solution per gallon of 20% persulfate solution.

The initial injection will consist of approximately 100 gallons of activated persulfate solution per injection point. The need for subsequent injections and the number and location of injection points to be utilized for subsequent injections will be determined following the collection and analysis of performance monitoring samples.

Groundwater performance monitoring samples will be collected on a quarterly basis from selected locations within and downgradient of the treatment zones. Sample analysis will include the following:

- VOCs by method 8260
- Persulfate by titration
- pH

Sample results will be forwarded to the DEC Project Manager within 10 days or reciept from the analytical laboratory.

4.8 POST REMEDIAL MONITORING PROGRAM

4.8.1 Post Remedial Groundwater Monitoring

A post-remedial groundwater sampling program will be initiated to evaluate the success of the remedial action and to monitor improvements to groundwater quality over time. Some of the existing groundwater monitoring wells at the Site will be destroyed during soil excavation and construction activity including wells MW1 MW2, MW4, MW5, MW8, MW9 and MW11. An attempt will be made to preserve all monitoring wells out side of the building foot print area including wells MW3, MW6. MW7, MW10 and MW12. Following building construction, six new groundwater monitoring wells will be installed as shown on **Figure 9**.

The wells in the monitoring program will be sampled on a quarterly basis for VOCs according to EPA method 8260. Groundwater monitoring activities will continue until permission to discontinue or reduce the frequency is granted by NYSDEC. Specific details describing the number and location of monitoring wells and proposed analyses will be presented as part of a Site Management Plan.

4.8.2 Post Remedial Soil Gas Sampling

Following the completion of the remedial action, subsurface soil vapor intrusion will be evaluated in accordance with applicable NYSDOH guidance and as directed by the NYSDEC. The need for post remedial soil gas sampling and specifics regarding the number and location of soil gas sampling points will be made in consultation with the NYSDEC and NYSDOH following an evaluation of the off-site vapor intrusion study which will be completed under OU2. On-site soil vapor intrusion is not a concern as an SSDS/vapor barrier or mechanical ventilation system will be applied to the planned buildings.

5.0 ENGINEERING CONTROLS

5.1 SUB-SLAB DEPRESSURIZATION SYSTEM (SSDS)

An SSDS and vapor barrier were designed and incorporated into the new building plans for the Phase I building. This building has full basement level which extends under the entire footprint of the building. The basement level houses the mechanical room, and tenant's storage rooms and will not be used for residential apartments.

An SSDS will not be required beneath the Phase II building since the basement level of this building will be used as a parking garage which must be ventilated to remove vehicle fumes in accordance with the NYC Building Code.

The SSDS beneath the Phase I basement level will consist of three separate venting zones. Each zone will provide coverage of between 3,600 to 4,000 sf of slab area. This is consistent with USEPA sub-slab depressurization design specifications which recommend a separate vent loop for every 4,000 sf of slab area.

The horizontal vent line is constructed of a continuous loop of perforated 4-inch HDPE smooth interior pipe. In each zone the horizontal pipe will extend to an adjacent utility chase-way where it will be piped individually to the roof via a 6-inch schedule 40 pvc line. Fill material around the horizontal vent piping is virgin-mined, ½ inch to ¾ inch gravel.

A high density polyethylene vapor barrier liner (HPDE) will be installed over the SSDS prior to pouring the building's concrete slab. The vapor barrier will consist of a 20 mil HDPE geomembrane liner manufactured by GSE Lining Technologies of North America, or equivalent. The vapor barrier will extend throughout the area occupied by the footprint of the new building which is to be constructed at the site. The specifications for installation will be provided to the construction management company and the foundation contractor or installer of the liner. The specifications state that all vapor barrier seams, penetrations, and repairs will be sealed either by the tape method or weld method, according to the manufacturer's recommendations and instructions.

An EBC field inspector under the direct supervision of a professional engineer will inspect and photograph the vapor barrier at several critical stages before during and after the installation is complete, to assure compliance with design specifications. Detailed specifications of the SSD system are provided **Attachment G**.

5.1.1 Criteria for Termination

The active SSDS in Phase I building will not be discontinued without written approval by NYSDEC and NYSDOH. A proposal to discontinue the active SSDS may be submitted by the property owner based on confirmatory data that justifies such request. Systems will remain in place and operational until permission to discontinue use is granted in writing by NYSDEC and NYSDOH.

5.2 MECHANICAL VENTILATION (PARKING GARAGE)

The parking garage beneath the Phase II building will be subject to active ventilation at a rate of 1.5 cubic ft per minute as required by the NYC Mechanical code (section 404). To meet the code requirement, the mechanical engineer for the project has specified a ventilation system with roof mounted exhaust fans which will exhaust 27,760 cubic ft per minute to the exterior. Fresh air make-up to the garage space will be provided through the two garage entrances which will have grated doors to maintain the ambient air supply under a closed door condition. The ventilation system as described is designed to provide 9.47 air changes per hour to the Phase II building garage.

6.0 INSTITUTIONAL CONTROLS

After the remedy is complete, the Site will have residual contamination remaining in place. Engineering Controls (ECs) will be incorporated into the remedy to render the overall Site remedy protective of public health and the environment. Two elements have been designed to ensure continual and proper management of residual contamination in perpetuity: an Environmental Easement and an SMP.

A Site-Specific Environmental Easement will be recorded with Queens County to provide an enforceable means of ensuring the continual and proper management of residual contamination and protection of public health and the environment in perpetuity or until released in writing by NYSDEC. It requires that the grantor of the Environmental Easement and the grantor's successors and assigns adhere to all Engineering and Institutional Controls (ECs/ICs) placed on this Site by this NYSDEC-approved remedy. ICs provide restrictions on Site usage and mandate operation, maintenance, monitoring and reporting measures for all ECs and ICs.

The SMP describes appropriate methods and procedures to ensure compliance with all ECs and ICs that are required by the Environmental Easement. Once the SMP has been approved by the NYSDEC, compliance with the SMP is required by the grantor of the Environmental Easement and grantor's successors and assigns.

6.1 ENVIRONMENTAL EASEMENT

An Environmental Easement, as defined in Article 71 Title 36 of the Environmental Conservation Law, is required when residual contamination is left on-Site after the Remedial Action is complete. If the Site will have residual contamination after completion of all Remedial Actions than an Environmental Easement is required. As part of this remedy, an Environmental Easement approved by NYSDEC will be filed and recorded with the Queens County Clerk. The Environmental Easement will be submitted as part of the Final Engineering Report.

The Environmental Easement renders the Site a Controlled Property. The Environmental Easement must be recorded with the Queens County Clerk before the Certificate of Completion (COC) can be issued by NYSDEC. A series of Institutional Controls may be required under this remedy to implement, maintain and monitor these Engineering Conntrol systems, prevent future exposure to residual contamination by continuing chemical oxidant treatment of groundwater, by maintaining an SSDS and restricting groundwater use at the Site. These ICs are requirements or restrictions placed on the Site that are listed in, and required by, the Environmental Easement. ICs can, generally, be subdivided between controls that support Engineering Controls, and those that place general restrictions on Site usage or other requirements. Institutional Controls in both of these groups are closely integrated with the SMP, which provides all of the methods and procedures to be followed to comply with this remedy.

The Institutional Controls which will be needed to support Engineering Controls are:

- Compliance with the Environmental Easement by the Grantee and the Grantee's successors and adherence of all elements of the SMP is required;
- All Engineering Controls must be operated and maintained as specified in this SMP;

- A soil vapor mitigation system consisting of a sub slab depressurization system under the occupied area of the building must be inspected, certified, operated and maintained as required by the SMP;

- All Engineering Controls on the Controlled Property must be inspected and certified at a frequency and in a manner defined in the SMP;

- Groundwater, soil vapor, and other environmental or public health monitoring must be performed as defined in the SMP;

- Data and information pertinent to Site Management for the Controlled Property must be reported at the frequency and in a manner defined in the SMP;

- On-Site environmental monitoring devices, including but not limited to, groundwater monitor wells and soil vapor probes, must be protected and replaced as necessary to ensure proper functioning in the manner specified in the SMP;

- Engineering Controls may not be discontinued without an amendment or extinguishment of the Environmental Easement.

Adherence to these ICs for the Site is mandated by the Environmental Easement and will be implemented under the SMP. The Controlled Property (Site) may also have a series of ICs in the form of Site restrictions and requirements. The Site restrictions that may apply to the Controlled Property are:

- Use of groundwater underlying the Controlled Property is prohibited without treatment rendering it safe for intended purpose;

- The Controlled Property may be used for restricted residential use provided that the EC/ICs included in this SMP are employed.

- Grantor agrees to submit to NYSDEC a written statement that certifies, under penalty of perjury, that: (1) controls employed at the Controlled Property are unchanged from the previous certification or that any changes to the controls were approved by the NYSDEC; and, (2) nothing has occurred that impairs the ability of the controls to protect public health and environment or that constitute a violation or failure to comply with the SMP. NYSDEC retains the right to access such Controlled Property at any time in order to evaluate the continued maintenance of any and all controls. This certification shall be submitted annually, or an alternate period of time that NYSDEC may allow. This annual statement must be certified by an expert that the NYSDEC finds acceptable.

6.2 SITE MANAGEMENT PLAN

Site Management is the last phase of remediation and begins with the approval of the Final Engineering Report and issuance of the COC for the Remedial Action. The SMP is submitted as part of the FER but will be written in a manner that allows its removal and use as a complete and independent document. Site Management continues in perpetuity or until released in writing by

the NYSDEC. The property owner is responsible to ensure that all Site Management responsibilities defined in the Environmental Easement and the SMP are performed.

The SMP is intended to provide a detailed description of the procedures required to manage residual contamination left in place at the Site following completion of the Remedial Action in accordance with the BCA with the NYSDEC. This includes: (1) development, implementation, and management of all Engineering and Institutional Controls; (2) development and implementation of monitoring systems and a Monitoring Plan; (3) development of a plan to operate and maintain any treatment, collection, containment, or recovery systems (including, where appropriate, preparation of an Operation and Maintenance Manual); (4) submittal of Site Management Reports, performance of inspections and certification of results, and demonstration of proper communication of Site information to NYSDEC; and (5) defining criteria for termination of treatment system operation.

To address these needs, the SMP will include four plans: (1) an Engineering and Institutional Control Plan for implementation and management of EC/ICs; (2) a Monitoring Plan for implementation of Site Monitoring; (3) an Operation and Maintenance Plan for implementation of remedial collection, containment, treatment, and recovery systems; and (4) a Site Management Reporting Plan for submittal of data, information, recommendations, and certifications to NYSDEC. The SMP will be prepared in accordance with the requirements in NYSDEC t DER-10 Technical Guidance for Site Investigation and Remediation, and the guidelines provided by NYSDEC.

Site management activities, reporting, and EC/IC certification will be scheduled on a certification period basis. The certification period will be annually. The Site Management Plan will be based on a calendar year and will be due for submission to NYSDEC by March 1 of the year following the reporting period.

The SMP in the FER will include a monitoring plan for groundwater at the down-gradient Site perimeter to evaluate Site-wide performance of the remedy. Appropriately placed groundwater monitor wells will also be installed immediately down-gradient of all volatile organic compound remediation areas for the purpose of evaluation of the effectiveness of the remedy that is implemented.

No exclusions for handling of residual contaminated soils will be provided in the SMP. All handling of residual contaminated material will be subject to provisions contained in the SMP.

7.0 FINAL ENGINEERING REPORT

An FER will be submitted to NYSDEC following implementation of the Remedial Action defined in this RAWP. The FER provides the documentation that the remedial work required under this RAWP has been completed and has been performed in compliance with this plan. The FER will provide a comprehensive account of the locations and characteristics of all material removed from the Site including the surveyed map(s) of all sources. The FER will include as-built drawings for all constructed elements, certifications, manifests, bills of lading as well as the complete SMP (formerly the Operation and Maintenance Plan). The FER will provide a description of the changes in the Remedial Action from the elements provided in the RAWP and associated design documents. The FER will provide a tabular summary of all performance evaluation sampling results and all material characterization results and other sampling and chemical analysis performed as part of the Remedial Action. The FER will provide test results demonstrating that all mitigation and remedial systems are functioning properly. The FER will be prepared in conformance with DER-10.

Where determined to be necessary by NYSDEC, a Financial Assurance Plan will be required to ensure the sufficiency of revenue to perform long-term operations, maintenance and monitoring tasks defined in the SMP and Environmental Easement. This determination will be made by NYSDEC in the context of the FER review.

The FER will include written and photographic documentation of all remedial work performed under this remedy. The FER will provide a thorough summary of all residual contamination left on the Site after the remedy is complete. Residual contamination includes all contamination that exceeds the Track 1 Unrestricted Use SCO in 6NYCRR Part 375-6. A table that shows exceedances from Track 1 Unrestricted SCOs for all soil/fill remaining at the Site after the Remedial Action and a map that shows the location and summarizes exceedances from Track 1 Unrestricted SCOs for all soil/fill remaining at the Site after the Remedial Action will be included in the FER.

The FER will provide a thorough summary of all residual contamination that exceeds the SCOs defined for the Site in the RAWP and must provide an explanation for why the material was not removed as part of the Remedial Action. A table that shows residual contamination in excess of Site SCOs and a map that shows residual contamination in excess of Site SCOs will be included in the FER.

The FER will include an accounting of the destination of all material removed from the Site, including excavated contaminated soil, historic fill, solid waste, hazardous waste, non-regulated material, and fluids. Documentation associated with disposal of all material must also include records and approvals for receipt of the material. It will provide an accounting of the origin and chemical quality of all material imported onto the Site.

Before approval of a FER and issuance of a COC, all project reports must be submitted in digital form on electronic media (PDF).

8.0 SCHEDULE

The Work is anticipated to begin approximately 1 month following NYSDEC approval of the RAWP and would be substantially completed within 18 months. The estimated duration of the excavation and soil handling activity is eight to sixteen weeks. The remedial action includes continuation of the injection of chemical oxidants into the groundwater. Site restoration and the installation of sub-slab venting systems will be performed as per the redevelopment plans for the site.

The anticipated schedule of milestone events is as follows:

Schedule Milestone	Estimated Completion Date
NYSDEC Approval of RAWP	December 2010
NYCOER Issuance of Notice to Proceed	December 2010
Building Demolition	January 2011
Excavation of UIC Drainage Structures	February 2011
Excavation of Hot Spot Areas	February 2011
Removal of Historic Fill	March 2011
Excavation of Basement Levels	June 2011
Submission of Chemical Inj Design Report	July 2011
Installation of Sub-Slab Venting System	August 2011
Installation of Chemical Inj. Wells	September 2011
Installation of Monitoring Wells	October 2011
Submission of SMP/FER	October 2011

TABLES

TABLE 1A
Former Uniforms For Industry Site
129-09 Jamaica Avenue, Richmond Hill, NY
Soil Analytical Results
Test Pit Samples - VOCs

Samples Collected 9/10

COMPOUND	Track 1 Unrestricted Cleanup Objectives	Restricted Residential Cleanup Objectives	Test Pit 1	Test Pit 2	Test Pit 3	Distribution Box
Sample Results in µg/kg	*ug/kg*	*ug/kg*	*ug/Kg*	*ug/Kg*	*ug/Kg*	*ug/Kg*
1,1,1,2-Tetrachloroethane			ND	ND	ND	ND
1,1,1-Trichloroethane	680	100,000	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane			ND	ND	ND	ND
1,1,2-Trichloroethane			ND	ND	ND	ND
1,1-Dichloroethane	270	26,000	ND	ND	ND	ND
1,1-Dichloroethylene	330	100,000	ND	ND	ND	ND
1,1-Dichloropropylene			ND	ND	ND	ND
1,2,3-Trichlorobenzene			ND	ND	ND	ND
1,2,3-Trichloropropane			ND	ND	ND	ND
1,2,4-Trichlorobenzene			ND	ND	ND	ND
1,2,4-Trimethylbenzene	3,600	52,000	ND	ND	ND	ND
1,2,4,5-Tetramethylbenene			ND	ND	ND	ND
1,2-dibromo-3-chloropropane			ND	ND	ND	ND
1,2-Dibromoethane			ND	ND	ND	ND
1,2-Dichlorobenzene	1,100	100,000	ND	ND	ND	ND
1,2-Dichloroethane	20	3,100	ND	ND	ND	ND
1,2-Dichloropropane			ND	ND	ND	ND
1,3,5-Trimethylbenzene	8,400	52,000	ND	ND	ND	ND
1,3-Dichlorobenzene	2,400	49,000	ND	ND	ND	ND
1,3-Dichloropropane			ND	ND	ND	ND
1,4-Dichlorobenzene	1,800	13,000	ND	ND	ND	ND
2,2-Dichloropropane			ND	ND	ND	ND
2-Butanone			ND	ND	ND	ND
2-Chloroethyl vinyl ether			ND	ND	ND	ND
2-Chlorotoluene			ND	ND	ND	ND
2-Hexanone			ND	ND	ND	ND
2-Propanol			ND	ND	ND	ND
4-Chlorotoluene			ND	ND	ND	ND
4-Isopropyltoluene			ND	ND	ND	ND
4-Methyl-2-pentanone			ND	ND	ND	ND
Acetone	50	100,000	ND	ND	ND	ND
Acrolein			ND	ND	ND	ND
Acrylonitrile			ND	ND	ND	ND
Benzene	60	4,800	ND	ND	ND	ND
Bromobenzene			ND	ND	ND	ND
Bromochloromethane			ND	ND	ND	ND
Bromodichloromethane			ND	ND	ND	ND
Bromoform			ND	ND	ND	ND
Bromomethane			ND	ND	ND	ND
Carbon disulfide			ND	ND	ND	ND
Carbon tetrachloride	760	2,400	ND	ND	ND	ND
Chlorobenzene	1	100,000	ND	ND	ND	ND
Chlorodifluoromethane			ND	ND	ND	ND
Chloroethane	1,100		ND	ND	ND	ND
Chloroform	370	49,000	ND	ND	ND	ND
Chloromethane			ND	ND	ND	ND
cis-1,2-Dichloroethene	440	100,000	ND	**5.8** J	ND	ND
cis-1,3-Dichloropropene			ND	ND	ND	ND
Dibromochloromethane			ND	ND	ND	ND
Dibromomethane			ND	ND	ND	ND
Dichlorodifluoromethane			ND	ND	ND	ND
Diisopropyl ether			ND	ND	ND	ND
Ethanol			ND	ND	ND	ND
Ethyl acetate			ND	ND	ND	ND
Ethylbenzene	1,000	41,000	ND	ND	ND	ND
Freon-114			ND	ND	ND	ND
Hexachlorobutadiene			ND	ND	ND	ND
Isopropyl acetate			ND	ND	ND	ND
Isopropylbenzene			ND	ND	ND	ND
p-Isopropyltoluene			ND	ND	ND	ND
p-&m-Xylenes	260	100,000	ND	ND	ND	ND
MTBE	930	100,000	ND	ND	ND	ND
Methylene chloride	50	100,000	**7.1** J, B	**23** B	**23** B	**7.3** JB
n-Amyl acetate			ND	ND	ND	ND
Naphthalene	12,000	100,000	ND	ND	ND	ND
n-Butyl acetate			ND	ND	ND	ND
n-Butylbenzene	12,000	100,000	ND	ND	ND	ND
n-Propyl acetate			ND	ND	ND	ND
n-Propylbenzene	3,900	100,000	ND	ND	ND	ND
o-Xylene	260	100,000	ND	ND	ND	ND
p-Diethylbenzene			ND	ND	ND	ND
p-Ethyltoluene			ND	ND	ND	ND
sec-Butylbenzene	11,000	100,000	ND	ND	ND	ND
Styrene			ND	ND	ND	ND
t-Butyl alcohol			ND	ND	ND	ND
tert-Butylbenzene	5,900	100,000	ND	ND	ND	ND
Tetrachloroethylene	1,300	19,000	**170,000**	**69**	**16**	**830,000**
Toluene	700	100,000	ND	**2.2** J	ND	ND
trans-1,2-Dichloroethene			ND	ND	ND	ND
trans-1,3-Dichloroporopylene			ND	ND	ND	ND
Trichloroethylene	470	21,000	**340** J	ND	ND	**1,100** J
Trichlorofluoromethane			ND	ND	ND	ND
Vinyl acetate			ND	ND	ND	ND
Vinyl Chloride	20	900	ND	ND	ND	ND

BOLD	Exceedence of Track 1 Unrestricted Residential Cleanup Objective
BOLD	Exceedence of Restricted Residential Cleanup Objective

TABLE 1B
Former Uniforms for Industry Site
129-09 Jamaica Avenue, Richmond Hill, NY
Soil Analytical Results
Test Pit Samples - SVOCs

COMPOUND	Track 1 Unrestricted Cleanup Objectives	Restricted Residential Cleanup Objectives	Test Pit 1	Test Pit 2	Test Pit 3
Sample Results in µg/kg	*ug/kg*	*ug/kg*	*ug/Kg*	*ug/Kg*	*ug/Kg*
1,2,4-Trichlorobenzene			ND	ND	ND
1,2-Dichlorobenzene			ND	ND	ND
1,3-Dichlorobenzene			ND	ND	ND
1,4-Dichlorobenzene			ND	ND	ND
2,4-Dinitrotoluene			ND	ND	ND
2,6-Dinitrotoluene			ND	ND	ND
2-Chloronaphthalene			ND	ND	ND
2-Methylnaphthalene			ND	ND	ND
3,3'-Dichlorobenzidine			ND	ND	ND
3-Nitroaniline			ND	ND	ND
4-Bromophenyl phenyl ether			ND	ND	ND
4-Chloro-3-methylphenol			ND	ND	ND
4-Chloroaniline			ND	ND	ND
4-Chlorophenyl phenyl ether			ND	ND	ND
4-Nitroaniline			ND	ND	ND
Acenaphthene	20,000	100,000	ND	ND	ND
Acenaphthylene	100,000	100,000	ND	**122** J	ND
Aniline			ND	ND	ND
Anthracene	100,000	100,000	ND	**125** J	ND
Benzo(a)anthracene	1,000[f]	1,000	ND	**777**	ND
Benzo(a)pyrene	1,000[f]	1,000	ND	**1180**	**78.9** J
Benzo(b)fluoranthene	1,000[f]	1,000	ND	**1010**	ND
Benzo(g,h,i)perylene	100,000	100,000	ND	**268**	ND
Benzo(k)fluoranthene	800	3,900	ND	**947**	**73.3** J
Butyl benzyl phthalate			ND	ND	ND
Bis(2-chloroethoxy)methane			ND	ND	ND
Bis(2-chloroethyl)ether			ND	ND	ND
Bis(2-chloroisopropyl)ether			ND	ND	ND
Bis(2-ethylhexyl)phthalate			**1220**	ND	ND
Chrysene	1,000[f]	3,900	ND	**1030**	ND
Dibenzo(a,h)anthracene	330[e]	330	ND	**182** J	ND
Dibenzofuran			ND	ND	ND
Diethylphthalate			ND	ND	ND
Dimethylphthalate			ND	ND	ND
Di-n-butylphthalate			ND	ND	ND
Di-n-octylphthalate			ND	ND	ND
Fluoranthene	100,000[a]	100,000	ND	**1380**	ND
Fluorene	30,000	100,000	ND	ND	ND
Hexachlorobenzene			ND	ND	ND
Hexachlorobutadiene			ND	ND	ND
Hexachlorocyclopentadiene			ND	ND	ND
Hexachloroethane			ND	ND	ND
Indeno(1,2,3-cd)pyrene	500[f]	500	ND	**309**	ND
Isophorone			ND	ND	ND
Naphthalene	100,000[a]	12,000	ND	ND	ND
Nitrobenzene			ND	ND	ND
N-Nitrosodiphenylamine			ND	ND	ND
N-Nitrosodi-n-propylamine			ND	ND	ND
Phenanthrene	100,000[a]	100,000	ND	**292**	ND
Pyrene	100,000[a]	100,000	ND	**1320**	**72.6** J
Pyridine			ND	ND	ND

Notes:

6 NY`CRR Part 375-6 Remedial Program Soil Cleanup Objectives

The SCOs for residential, restricted-residential and ecological resources use were capped at a maximum value of 100 ppm.

ND - Not-detected

BOLD	Exceedence of Track 1 Unrestricted Residential Cleanup Objective
BOLD	Exceedence of Restricted Residential Cleanup Objective

TABLE 1C
Former Uniforms for Industry Site
129-09 Jamaica Avenue, Richmond Hill, NY
Soil Analytical Results
Test Pit Samples - Metals

COMPOUND	Track 1 Unrestricted Cleanup Objectives	Restricted Residential Cleanup Objectives	Test Pit 1	Test Pit 2	Test Pit 3
Sample Results in µg/kg	*ug/kg*	*ug/kg*	*ug/Kg*	*ug/Kg*	*ug/Kg*
Antimony			ND	2.52	ND
Arsenic	13	16	**5.98**	**13.2**	**8.55**
Barium	350	400	**181**	**1350**	**146**
Beryllium	7	72	ND	ND	ND
Cadmium	2.5 c	4	ND	ND	ND
Calcium			**3800**	**5240**	**11600**
Chromium	30 c	180	**23**	**33**	**23.1**
Cobalt			**8.95**	**8.55**	**7.33**
Copper	50	270	**39.8**	**301**	**48.1**
Iron			**27600**	**26900**	**21700**
Lead	63 c	400	**153**	**3780**	**200**
Magnesium			**2360**	**2310**	**3360**
Manganese	1600 c	2,000[f]	**520**	**558**	**409**
Nickel	30	310	**20.1**	**29.9**	**22.9**
Potassium			**985**	**917**	**644**
Selenium	3.9c	180	**4.88**	**6.29**	**4.56**
Silver	2	180	ND	ND	ND
Sodium			**1290**	**449**	**343**
Thallium			ND	ND	ND
Vanadium			**31.4**	**55.3**	**30.5**
Zinc	109 c	10,000[d]	**397**	**1050**	**156**
Mercury	0.18 c	0.81[j]	ND	ND	ND

Notes:

6 NY`CRR Part 375-6 Remedial Program Soil Cleanup Objectives

The SCOs for residential, restricted-residential and ecological resources use were capped at a maximum value of 100 ppm.

[f] - For constituents where the calculated SCO was lower than the rural soil background concentration as determined by the Department and Department of Health rural soil survey, the rural soil background

[j] - This SCO is the lower of the values for mercury (elemental) or mercury (inorganic salts).

[d] -The SCOs for metals were capped at a maximum value of 10,000 ppm

ND - Not-detected

BOLD	Exceedence of Track 1 Unrestricted Residential Cleanup Objective
BOLD	Exceedence of Restricted Residential Cleanup Objective

TABLE 1D
Former Uniforms for Industry Site
Soil Analytical Results
Test Pit Samples - Pesticides / PCBs

COMPOUND	Track 1 Unrestricted Cleanup Objectives	Restricted Residential Cleanup Objectives	Test Pit 1	Test Pit 2	Test Pit 3
Sample Results in µg/kg	*ug/kg*	*ug/kg*	*ug/Kg*	*ug/Kg*	*ug/Kg*
4,4-DDD	3.3	13,000	ND	ND	ND
4,4-DDE	3.3	8,900	ND	ND	ND
4,4-DDT	3.3	7,900	ND	ND	ND
Aldrin	5	97	ND	ND	ND
alpha-BHC	20	480	ND	ND	ND
beta-BHC	36	4,200	ND	ND	ND
Chlordane Total	94	360	ND	ND	ND
delta-BHC	40	100,000[a]	ND	ND	ND
Dieldrin	5	200.0	ND	ND	ND
Endosulfan I	2,400	24,000[i]	ND	ND	ND
Endosulfan II	2,400	24,000[i]	ND	ND	ND
Endosulfan Sulfate	2,400	24,000[i]	ND	ND	ND
Endrin	14	11,000	ND	ND	ND
Endrin aldehyde			ND	ND	ND
Endrin ketone			ND	ND	ND
gamma-BHC			ND	ND	ND
Heptachlor	42	2,100	ND	ND	ND
Heptachlor epoxide			ND	ND	ND
Methoxychlor			ND	ND	ND
Toxaphene			ND	ND	ND
PCB-1016	100	1,000	ND	ND	ND
PCB-1221	100	1,000	ND	ND	ND
PCB-1232	100	1,000	ND	ND	ND
PCB-1242	100	1,000	ND	ND	ND
PCB-1248	100	1,000	ND	ND	ND
PCB-1254	100	1,000	ND	ND	ND
PCB-1260	100	1,000	ND	ND	ND
PCB-1262	100	1,000	ND	**0.0560**	**0.0258**
PCB-1268	100	1,000	ND	ND	ND

Notes:

6 NY`CRR Part 375-6 Remedial Program Soil Cleanup Objectives

The SCOs for residential, restricted-residential and ecological resources use were capped at a maximum value of 100 ppm.

ND - Not-detected

BOLD	Exceedence of Track 1 Unrestricted Residential Cleanup Objective
BOLD	Exceedence of Restricted Residential Cleanup Objective

TABLE 2A
Former Uniforms For Industry Site
129-09 Jamaica Avenue, Richmond Hill, NY
Soil Analytical Results
Soil Borings - VOCs

Samples Collected 9/10

COMPOUND	Track 1 Unrestricted Cleanup Objectives	Restricted Residential Cleanup Objectives	10B-1 (15-20FT)	10B-2 (15-20FT)	10B-3 (15-20FT)	10B-5 (0-5FT)	10B-5 (10-12FT)	10B-7 (0-5FT)	10B-7 (10-15FT)
Sample Results in µg/kg	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*
1,1,1,2-Tetrachloroethane			ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	680	100,000	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane			ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane			ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	270	26,000	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethylene	330	100,000	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloropropylene			ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichlorobenzene			ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichloropropane			ND	ND	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene			**3.4** J	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	3,600	52,000	ND	**7,600**	**8,200**	**2.0** J	ND	ND	ND
1,2,4,5-Tetramethylbenene			ND	ND	ND	ND	ND	ND	ND
1,2-dibromo-3-chloropropane			ND	ND	ND	ND	ND	ND	ND
1,2-Dibromoethane			ND	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	1,100	100,000	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	20	3,100	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane			ND	ND	ND	ND	ND	ND	ND
1,3,5-Trimethylbenzene	8,400	52,000	ND	**3,400**	**2,100**	ND	ND	ND	ND
1,3-Dichlorobenzene	2,400	49,000	ND	ND	ND	ND	ND	ND	ND
1,3-Dichloropropane			ND	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1,800	13,000	ND	ND	ND	ND	ND	ND	ND
2,2-Dichloropropane			ND	**460**	ND	ND	ND	ND	ND
2-Butanone			ND	ND	ND	ND	ND	ND	ND
2-Chloroethyl vinyl ether			ND	ND	ND	ND	ND	ND	ND
2-Chlorotoluene			ND	ND	ND	ND	ND	ND	ND
2-Hexanone			ND	ND	ND	ND	ND	ND	ND
2-Propanol			ND	ND	ND	ND	ND	ND	ND
4-Chlorotoluene			ND	ND	ND	ND	ND	ND	ND
4-Isopropyltoluene			ND	ND	ND	ND	ND	ND	ND
4-Methyl-2-pentanone			ND	ND	ND	ND	ND	ND	ND
Acetone	50	100,000	ND	ND	ND	ND	ND	ND	ND
Acrylonitrile			ND	ND	ND	ND	ND	ND	ND
Benzene	60	4,800	ND	ND	ND	ND	ND	ND	ND
Bromobenzene			ND	ND	ND	ND	ND	ND	ND
Bromochloromethane			ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane			ND	ND	ND	ND	ND	ND	ND
Bromoform			ND	ND	ND	ND	ND	ND	ND
Bromomethane			ND	ND	ND	ND	ND	ND	ND
Carbon disulfide			ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	760	2,400	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	1	100,000	ND	ND	ND	ND	ND	ND	ND
Chlorodifluoromethane			ND	ND	ND	ND	ND	ND	ND
Chloroethane	1,100		ND	ND	ND	ND	ND	ND	ND
Chloroform	370	49,000	ND	ND	ND	ND	ND	ND	ND
Chloromethane			ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	440	100,000	ND	ND	ND	**51**	**5.4**	**4.4**	ND
cis-1,3-Dichloropropene			ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane			ND	ND	ND	ND	ND	ND	ND
Dibromomethane			ND	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane			ND	ND	ND	ND	ND	ND	ND
Ethanol			ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	1,000	41,000	**1.8** J	**190** J	ND	ND	ND	ND	ND
Hexachlorobutadiene			ND	ND	ND	ND	ND	ND	ND
Isopropylbenzene			ND	**300** J	**260** J	ND	ND	ND	ND
p-Isopropyltoluene			ND	**2,900**	**4,200**	ND	ND	ND	ND
p-&m-Xylenes	260	100,000	**5.4** J	**430** J	**330** J	**5** J	ND	ND	ND
MTBE	930	100,000	ND	ND	ND	ND	ND	ND	ND
Methylene chloride	50	100,000	**19** JB	**1.6** JB	**3.2** JB	**16** JB	**16** JB	**14** JB	**15** JB
Naphthalene	12,000	100,000	ND	**310** J	**2,800** B	ND	ND	ND	ND
n-Butylbenzene	12,000	100,000	ND	**1,900**	**2,300**	ND	ND	ND	ND
n-Propylbenzene	3,900	100,000	ND	**440** J	**510** J	ND	ND	ND	ND
o-Xylene	260	100,000	ND	**460** J	ND	ND	ND	ND	ND
p-Diethylbenzene			ND	ND	ND	ND	ND	ND	ND
p-Ethyltoluene			ND	ND	ND	ND	ND	ND	ND
sec-Butylbenzene	11,000	100,000	ND	**1,500**	**1,600**	ND	ND	ND	ND
Styrene			ND	ND	ND	ND	ND	ND	ND
t-Butyl alcohol			ND	ND	ND	ND	ND	ND	ND
tert-Butylbenzene	5,900	100,000	ND	**280**	ND	ND	ND	ND	ND
Tetrachloroethylene	1,300	19,000	**4.6** J	**420**	**940**	**120**	**42**	**48**	**6.8**
Toluene	700	100,000	**3.4** J	**94**	ND	**7.5** J	ND	ND	ND
trans-1,2-Dichloroethene			ND	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloroporopylene			ND	ND	ND	ND	ND	ND	ND
Trichloroethylene	470	21,000	ND	ND	ND	**8.5** J	**2.2** J	**3.6**	ND
Trichlorofluoromethane			ND	ND	ND	ND	ND	ND	ND
Vinyl acetate			ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	20	900	ND	ND	ND	ND	ND	ND	ND

Note: Bold indicates exceedance of Unrestricted Cleanup Objective, shaded indicates exceedance of Restricted Residential Objective.

BOLD	Exceedence of Track 1 Unrestricted Residential Cleanup Objective
BOLD	Exceedence of Restricted Residential Cleanup Objective

TABLE 2B
Former Uniforms For Industry Site
129-09 Jamaica Avenue, Richmond Hill, NY
Soil Analytical Results
Soil Borings - VOCs

Samples Collected 9/10

COMPOUND	Track 1 Unrestricted Cleanup Objectives	Restricted Residential Cleanup Objectives	10B-8 (0-5FT)	10B-8 (10-15FT)	10B-9 (0-5FT)	10B-9 (10-15FT)	10B-10 (0-5FT)	10B-10 (10-15FT)	10B-11 (0-5FT)	10B-11 (10-15FT)
Sample Results in ug/kg	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*
1,1,1,2-Tetrachloroethane			ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	680	100,000	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane			ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane			ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	270	26,000	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethylene	330	100,000	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloropropylene			ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichlorobenzene			ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichloropropane			ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene			ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	3,600	52,000	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4,5-Tetramethylbenene			ND	ND	ND	ND	ND	ND	ND	ND
1,2-dibromo-3-chloropropane			ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromoethane			ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	1,100	100,000	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	20	3,100	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane			ND	ND	ND	ND	ND	ND	ND	ND
1,3,5-Trimethylbenzene	8,400	52,000	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	2,400	49,000	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichloropropane			ND	ND	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1,800	13,000	ND	ND	ND	ND	ND	ND	ND	ND
2,2-Dichloropropane			ND	ND	ND	ND	ND	ND	ND	ND
2-Butanone			ND	ND	ND	ND	ND	ND	ND	ND
2-Chloroethyl vinyl ether			ND	ND	ND	ND	ND	ND	ND	ND
2-Chlorotoluene			ND	ND	ND	ND	ND	ND	ND	ND
2-Hexanone			ND	ND	ND	ND	ND	ND	ND	ND
2-Propanol			ND	ND	ND	ND	ND	ND	ND	ND
4-Chlorotoluene			ND	ND	ND	ND	ND	ND	ND	ND
4-Isopropyltoluene			ND	ND	ND	ND	ND	ND	ND	ND
4-Methyl-2-pentanone			ND	ND	ND	ND	ND	ND	ND	ND
Acetone	50	100,000	ND	ND	ND	ND	ND	ND	ND	ND
Acrolein			ND	ND	ND	ND	ND	ND	ND	ND
Acrylonitrile			ND	ND	ND	ND	ND	ND	ND	ND
Benzene	60	4,800	ND	ND	ND	ND	ND	ND	ND	ND
Bromobenzene			ND	ND	ND	ND	ND	ND	ND	ND
Bromochloromethane			ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane			ND	ND	ND	ND	ND	ND	ND	ND
Bromoform			ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane			ND	ND	ND	ND	ND	ND	ND	ND
Carbon disulfide			ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	760	2,400	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	1	100,000	ND	ND	ND	ND	ND	ND	ND	ND
Chlorodifluoromethane			ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	1,100		ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	370	49,000	ND	ND	ND	ND	ND	ND	ND	ND
Chloromethane			ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	440	100,000	**6.7**	**3.9**	**70**	ND	**3.9** J	ND	**5.0** J	**3.7** J
cis-1,3-Dichloropropene			ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane			ND	ND	ND	ND	ND	ND	ND	ND
Dibromomethane			ND	ND	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane			ND	ND	ND	ND	ND	ND	ND	ND
Diisopropyl ether			ND	ND	ND	ND	ND	ND	ND	ND
Ethanol			ND	ND	ND	ND	ND	ND	ND	ND
Ethyl acetate			ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	1,000	41,000	ND	ND	ND	ND	ND	ND	ND	ND
Freon-114			ND	ND	ND	ND	ND	ND	ND	ND
Hexachlorobutadiene			ND	ND	ND	ND	ND	ND	ND	ND
Isopropyl acetate			ND	ND	ND	ND	ND	ND	ND	ND
Isopropylbenzene			ND	ND	ND	ND	ND	ND	ND	ND
p-Isopropyltoluene			ND	ND	ND	ND	ND	ND	ND	ND
p-&m-Xylenes	260	100,000	ND	ND	ND	ND	ND	ND	ND	ND
MTBE	930	100,000	ND	ND	ND	ND	ND	ND	ND	ND
Methylene chloride	50	100,000	**16** J,B	**15** J,B	**16** J,B	**15** J,B	**15** J,B	**14** J,B	**12** J,B	**13** J,B
n-Amyl acetate			ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	12,000	100,000	ND	ND	ND	ND	ND	ND	ND	ND
n-Butyl acetate			ND	ND	ND	ND	ND	ND	ND	ND
n-Butylbenzene	12,000	100,000	ND	ND	ND	ND	ND	ND	ND	ND
n-Propyl acetate			ND	ND	ND	ND	ND	ND	ND	ND
n-Propylbenzene	3,900	100,000	ND	ND	ND	ND	ND	ND	ND	ND
o-Xylene	260	100,000	ND	ND	ND	ND	ND	ND	ND	ND
p-Diethylbenzene			ND	ND	ND	ND	ND	ND	ND	ND
p-Ethyltoluene			ND	ND	ND	ND	ND	ND	ND	ND
sec-Butylbenzene	11,000	100,000	ND	ND	ND	ND	ND	ND	ND	ND
Styrene			ND	ND	ND	ND	ND	ND	ND	ND
t-Butyl alcohol			ND	ND	ND	ND	ND	ND	ND	ND
tert-Butylbenzene	5,900	100,000	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethylene	1,300	19,000	**140**	**37**	**2,000**	**33**	**38**	**38**	**24**	**9.3** J
Toluene	700	100,000	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene			ND	ND	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloroporopylene			ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethylene	470	21,000	**3.5** J	**2.1** J	**55**	ND	**2.2** J	ND	**2.2** J	ND
Trichlorofluoromethane			ND	ND	ND	ND	ND	ND	ND	ND
Vinyl acetate			ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	20	900	ND	ND	ND	ND	ND	ND	ND	ND

Note: Bold indicates exceedance of Unrestricted Cleanup Objective, shaded indicates exceedance of Restricted Residential Objective.

BOLD	Exceedence of Track 1 Unrestricted Residential Cleanup Objective
BOLD	Exceedence of Restricted Residential Cleanup Objective

TABLE 2C
Former Uniforms For Industry Site
129-09 Jamaica Avenue, Richmond Hill, NY
Soil Analytical Results
Soil Borings - VOCs

Samples Collected 9/10

COMPOUND	Track 1 Unrestricted Cleanup Objectives	Restricted Residential Cleanup Objectives	10B-12 (0-5FT)	10B-12 (10-15FT)	10B-13 (10-15FT)	10B-14 (0-5FT)	10B-14 (10-15FT)	10B-15 (0-5FT)	Distribution Box
Sample Results in µg/kg	*ug/kg*								
1,1,1,2-Tetrachloroethane			ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	680	100,000	**1,300**	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane			ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane			ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	270	26,000	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethylene	330	100,000	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloropropylene			ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichlorobenzene			ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichloropropane			ND	ND	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene			ND	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	3,600	52,000	ND	ND	140 J	ND	ND	ND	ND
1,2,4,5-Tetramethylbenene			ND	ND	ND	ND	ND	ND	ND
1,2-dibromo-3-chloropropane			ND	ND	ND	ND	ND	ND	ND
1,2-Dibromoethane			ND	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	1,100	100,000	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	20	3,100	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane			ND	ND	ND	ND	ND	ND	ND
1,3,5-Trimethylbenzene	8,400	52,000	ND	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	2,400	49,000	ND	ND	ND	ND	ND	ND	ND
1,3-Dichloropropane			ND	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1,800	13,000	ND	ND	ND	ND	ND	ND	ND
2,2-Dichloropropane			ND	ND	ND	ND	ND	ND	ND
2-Butanone			ND	ND	ND	ND	ND	ND	ND
2-Chloroethyl vinyl ether			ND	ND	ND	ND	ND	ND	ND
2-Chlorotoluene			ND	ND	ND	ND	ND	ND	ND
2-Hexanone			ND	ND	ND	ND	ND	ND	ND
2-Propanol			ND	ND	ND	ND	ND	ND	ND
4-Chlorotoluene			ND	ND	ND	ND	ND	ND	ND
4-Isopropyltoluene			ND	ND	ND	ND	ND	ND	ND
4-Methyl-2-pentanone			ND	ND	ND	ND	ND	ND	ND
Acetone	50	100,000	ND	ND	ND	ND	ND	ND	ND
Acrolein			ND	ND	ND	ND	ND	ND	ND
Acrylonitrile			ND	ND	ND	ND	ND	ND	ND
Benzene	60	4,800	ND	ND	ND	ND	ND	ND	ND
Bromobenzene			ND	ND	ND	ND	ND	ND	ND
Bromochloromethane			ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane			ND	ND	ND	ND	ND	ND	ND
Bromoform			ND	ND	ND	ND	ND	ND	ND
Bromomethane			ND	ND	ND	ND	ND	ND	ND
Carbon disulfide			ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	760	2,400	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	1	100,000	ND	ND	ND	ND	ND	ND	ND
Chlorodifluoromethane			ND	ND	ND	ND	ND	ND	ND
Chloroethane	1,100		ND	ND	ND	ND	ND	ND	ND
Chloroform	370	49,000	ND	ND	ND	ND	ND	ND	ND
Chloromethane			ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	440	100,000	**42,000**	18	**450** J	ND	4.3 J	20	7.3 J
cis-1,3-Dichloropropene			ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane			ND	ND	ND	ND	ND	ND	ND
Dibromomethane			ND	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane			ND	ND	ND	ND	ND	ND	ND
Diisopropyl ether			ND	ND	ND	ND	ND	ND	ND
Ethanol			ND	ND	ND	ND	ND	ND	ND
Ethyl acetate			ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	1,000	41,000	ND	ND	ND	ND	ND	ND	ND
Freon-114			ND	ND	ND	ND	ND	ND	ND
Hexachlorobutadiene			ND	ND	ND	ND	ND	ND	ND
Isopropyl acetate			ND	ND	ND	ND	ND	ND	ND
Isopropylbenzene			ND	ND	ND	ND	ND	ND	ND
p-Isopropyltoluene			ND	ND	ND	ND	ND	ND	ND
p-&m-Xylenes	260	100,000	ND	ND	ND	ND	ND	ND	ND
MTBE	930	100,000	ND	ND	ND	ND	ND	ND	ND
Methylene chloride	50	100,000	680 J,B	13 J,B	3.5 J, B	640 J,B	11 J,B	16 J,B	11 J,B
n-Amyl acetate			ND	ND	ND	ND	ND	ND	ND
Naphthalene	12,000	100,000	ND	ND	290	ND	ND	ND	ND
n-Butyl acetate			ND	ND	ND	ND	ND	ND	ND
n-Butylbenzene	12,000	100,000	ND	ND	ND	ND	ND	ND	ND
n-Propyl acetate			ND	ND	ND	ND	ND	ND	ND
n-Propylbenzene	3,900	100,000	ND	ND	ND	ND	ND	ND	ND
o-Xylene	260	100,000	ND	ND	ND	ND	ND	ND	ND
p-Diethylbenzene			ND	ND	ND	ND	ND	ND	ND
p-Ethyltoluene			ND	ND	ND	ND	ND	ND	ND
sec-Butylbenzene	11,000	100,000	ND	ND	ND	ND	ND	ND	ND
Styrene			ND	ND	ND	ND	ND	ND	ND
t-Butyl alcohol			ND	ND	ND	ND	ND	ND	ND
tert-Butylbenzene	5,900	100,000	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethylene	1,300	19,000	**39,000**	85	**350,000**	720	21	170	**830,000**
Toluene	700	100,000	100	ND	ND	120	ND	ND	ND
trans-1,2-Dichloroethene			610	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloroporopylene			ND	ND	ND	ND	ND	ND	ND
Trichloroethylene	470	21,000	**8,100**	5.5 J	**1,100**	ND	2.0 J	12 J	1,100
Trichlorofluoromethane			ND	ND	ND	ND	ND	ND	ND
Vinyl acetate			ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	20	900	ND	ND	ND	ND	ND	ND	ND

BOLD	Exceedence of Track 1 Unrestricted Residential Cleanup Objective
BOLD	Exceedence of Restricted Residential Cleanup Objective

TABLE 3
Former Uniforms For Industry Site
129-09 Jamaica Avenue, Richmond Hill, NY
Parameters Detected Above Unrestricted / Restricted Residential Soil Cleanup Objectives

Vertex and GCE Samples

COMPOUND	Track 1 Unrestricted Cleanup Objectives	Restricted Residential Cleanup Objectives	VSB1 (0-4FT)	VSB3 (0-4FT)	Mop Oil Room (30-32FT)	Filter Room (32-34FT)	MW1 (30-31.5FT)	MW1 (45FT)	B1 (30-32FT)	B2 (35-37FT)
Sample Results in µg/kg	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*
1,2,4-trimethylbenzene	3,600	52,000	ND	ND	ND	ND	**10,000**	**2,600**	**4,800**	**83,000**
1,3,5-trimethylbenzene	8,400	52,000	ND	ND	ND	ND	ND	ND	ND	**21,000**
Acetone	50	100,000	ND	ND	ND	ND	**460**	**470**	**290**	**7,600**
Cis-DCE	250	59,000	**346**	**2,450**	ND	ND	ND	ND	ND	ND
Ethylbenzene	1,000	41,000	ND	ND	**1,460**	**1,560**	ND	ND	ND	**3,600**
m/p-Xylenes	260	100,000	**2,570**	ND	**2,750**	**9,190**	ND	ND	**470**	**11,000**
Napthalene	12,000	NS	ND	ND	ND	ND	ND	ND	ND	ND
n-butylbenzene	3,900	100,000	ND	ND	ND	**8,010**	ND	ND	ND	**14,000**
n-propylbenzene	12,000	100,000	ND	ND	ND	ND	ND	ND	ND	ND
o-Xylene	260	100,000	**1,750**	ND	**2,270**	ND	ND	ND	**310**	**8,300**
sec-butylbenzene	11,000	100,000	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethylene (PCE)	1,300	19,000	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	700	100,000	ND	ND	ND	ND	ND	ND	ND	ND
4,4-DDD	3.3	13,000.0	ND	ND	ND	ND	ND	ND	ND	ND

BOLD Exceedence of Track 1 Unrestricted Residential Cleanup Objective
BOLD Exceedence of Restricted Residential Cleanup Objective

ELM Samples

COMPOUND	Track 1 Unrestricted Cleanup Objectives	Restricted Residential Cleanup Objectives	B13 (18FT)	B13 (42FT)	B13 (63FT)	B15 (38FT)	B15 (52.5FT)	B15 (67.5FT)	B16 (52.5FT)	B19 (44FT)	B19 (64.5FT)	B19 (74FT)
Sample Results in µg/kg	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*
1,2,4-trimethylbenzene	3,600	52,000	**4,600**	**140,000**	**52,000**	**8,900**	**140,000**	**26,000**	**170,000**	**110,000**	**7,500**	ND
1,3,5-trimethylbenzene	8,400	52,000	ND	**53,000**	ND	ND	**46,000**	ND	**56,000**	**34,000**	ND	ND
Acetone	50	100,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cis-DCE	250	59,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	1,000	41,000	ND	ND	ND	ND	ND	ND	ND	**13,000**	**6,700**	**2,000**
m/p-Xylenes	260	100,000	ND	**13,000**	**1,200**	ND	**2,100**	ND	ND	**20,000**	ND	ND
Napthalene	12,000	NS	ND	**17,000**		ND	**1,300**	ND	ND	**48,000**	**19,000**	**19,000**
n-butylbenzene	3,900	100,000	ND	**28,000**	**22,000**	ND	**41,000**	**11,000**	**54,000**	**27,000**	**11,000**	**5,600**
n-propylbenzene	12,000	100,000	ND	**17,000**	ND	ND	**19,000**	ND	**25,000**	ND	ND	ND
o-Xylene	260	100,000	ND	ND	ND	ND	ND	ND	ND	**8,700**	ND	ND
sec-butylbenzene	11,000	100,000	ND	**13,000**	**11,000**	ND	**19,000**	ND	**29,000**	**24,000**	ND	ND
Tetrachloroethylene (PCE)	1,300	19,000	**6,300**	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	700	100,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4,4-DDD	3.3	13,000.0	ND	ND	**4.9**	**17**	**7.5**	ND	ND	ND	ND	ND

BOLD Exceedence of Track 1 Unrestricted Residential Cleanup Objective

TABLE 4A
Former Uniforms for Industry Site
129-09 Jamaica Avenue, Richmond Hill, NY
Historic VOC Detections in On-Site Monitoring Wells

Parameter	MW1	MW1	MW1	MW1	MW1	MW1	MW1	MW2	MW2	MW2	MW2*	MW2	MW2	MW2	MW3	MW3	MW3	MW3	MW3	MW3	MW3
ug/L	2/17-18/2004	11/24/2004	8/11/2005	4/18/2006	1/17/2007	11/1/2008	9/20/2010	2/17-18/2004	11/24/2004	8/11/2005	4/18/2006	1/17/2007	11/1/2008	9/20/2010	3/26/2004	11/24/2004	8/11/2005	4/18/2006	1/17/2007	11/1/2008	9/20/2010
1,2,4-trimethylbenzene	650	2300	prod (thin)	N/A	N/A	830	1900			prod (thin)	N/A	prod (0.31 ft)	prod			19	24				
1,3,5-trimethylbenzene	120	680		N/A		340	530				N/A					110	6.2				
1-1 Dichloroethene																12	3.2				
2-Butanone	280					63															
2-Hexanone		190																			
4-Isopropyltoluene	180			N/A				21													
4-Methyl 2-Pentanone	50	190																			
Acetone	1600	460		27		6.6					5.3										
Benzene											5.6										
Chloroethane									95		7.8					95					
Cis 1-2 DCE	4500	6600		7200		980	1400	7.4	5.6						2000	9800	3900	140	15	390	2.1
Ethylbenzene	94	91		97		89	62	27	96		31										
Isopropylbenzene	82	100		N/A		82	64	13	19		N/A					6	2.6				
m/p - xylene	520	440		N/A		310		27	100		N/A					16					
Methylene Chloride				12			6.1							4.8	21				1.2		4.2
MTBE														1							
Napthalene	160	160		N/A		52	250				N/A					19	9.9				
n-butylbenzene	74	180		N/A		130	120		10		N/A					30	1.2				
n-propylbenzene	190	240		N/A		110	140	23	26		N/A					2.4					
o-xylenes	350	280		N/A		230		12	6.8		N/A					19	7.9				
p-diethylbenzene	240			N/A				51			N/A										
p-ethyltoluene	1400			N/A				63			N/A										
p-isopropyltoluene		86		N/A			90		5.1		N/A					10	4.3				
sec-butylbenzene	74	110		N/A		37	74	8.8	7.2		N/A					3.7	2.5				
tert-butylbenzene				N/A				20	1.1		N/A					1.2					
tetrachloroethene						7									1000	140	190	37	28	74	6.4
toluene	67			25		77	45	2.3	21		10			0.83		9.9	1.4				
Trans 1-2 DCE				13		8.7										29	5.2	1.6			
trichloroethene						1								2.7	260	39	38	6.9	3.8	15	1
vinyl chloride	320	160		460		300	74	5.5	280		150				4.9	120	32	1.7		25	
Xylenes (total)				810		31	410				31										
TVOCs	10,951	12,267		8,644		3,684	5,165	281	673		241			9	3,286	10,481	4,228	187	48	504	14
CVOCs	4,820	6,760		7,673		1,297	1,474	13	381		158			3	3,265	10,235	4,168	187	47	504	10
PVOCs	4,531	4,857		932		2,381	3,685	268	292		78			1	0	246	60	0	0	0	0

*prod (0.31 ft)

TABLE 4B
Former Uniforms for Industry Site
129-09 Jamaica Avenue, Richmond Hill, NY
Historic VOC Detections in On-Site Monitoring Wells

Parameter	MW4	MW4	MW4	MW4	MW4	MW4	MW4	MW5	MW5	MW5	MW5	MW5	MW6	MW6	MW6	MW6	MW6	MW7	MW7	MW7	MW7	MW7
ug/L	3/26/2004	11/24/2004	8/11/2005	4/18/2006	1/17/2007	11/1/2008	9/20/2010	8/11/2005	4/18/2006	1/17/2007	11/1/2008	9/20/2010	8/11/2005	4/18/2006	1/17/2007	11/1/2008	9/20/2010	8/11/2005	4/18/2006	1/17/2007	11/1/2008	9/20/2010
1,2,4-trimethylbenzene				N/A	N/A				N/A	N/A	23	5.1	13	N/A	N/A	15			N/A	N/A		
1,3,5-trimethylbenzene				N/A	N/A				N/A	N/A	7.6	1.9	190	N/A	N/A	5.3			N/A	N/A		
1-1 Dichloroethene				1.8									3									
2-Butanone																13						
2-Hexanone																						
4-Isopropyltoluene				N/A	N/A														N/A	N/A		
4-Methyl 2-Pentanone																						
Acetone				2.6					2.8					2.8								
Benzene																						
Chloroethane						71	1.9			1.1												
Cis 1-2 DCE	97	1300	970	2100	550	280	140	500	360	460	65	210	3500	750	7800	210	76	80	72	8.9		
Ethylbenzene											2	1.2	21			1.1						
Isopropylbenzene				N/A	N/A				N/A	N/A	2.1	1.2	27	N/A	N/A	1.4			N/A	N/A		
m/p - xylene				N/A	N/A				N/A	N/A	6.9		11	N/A	N/A	4.4			N/A	N/A		
Methylene Chloride	19						5					4.2					4.2					4.2
Napthalene				N/A	N/A			2.4	N/A	N/A			17	N/A	N/A				N/A	N/A		
n-butylbenzene				N/A	N/A				N/A	N/A	2.5		8.9	N/A	N/A	1.7			N/A	N/A		
n-propylbenzene				N/A	N/A				N/A	N/A	4	1.3	29	N/A	N/A	3.4			N/A	N/A		
o-xylenes			0.84	N/A	N/A				N/A	N/A			76	N/A	N/A	2.7			N/A	N/A		
p-diethylbenzene				N/A	N/A				N/A	N/A				N/A	N/A				N/A	N/A		
p-ethyltoluene				N/A	N/A				N/A	N/A				N/A	N/A				N/A	N/A		
p-isopropyltoluene				N/A	N/A				N/A	N/A		0.85	35	N/A	N/A				N/A	N/A		
sec-butylbenzene				N/A	N/A	8	7.4	1.1	N/A	N/A	2		17	N/A	N/A	1.5	3.3		N/A	N/A		
tert-butylbenzene				N/A	N/A	1.6	1.5		N/A	N/A	1.1		5.7	N/A	N/A		0.98		N/A	N/A		
tetrachloroethene	17	16	81	100	82	11	19	160	230	72	15	32	36	130		62	100	71	24	14	7.5	1.1
toluene													11	0.31		1.1						
Trans 1-2 DCE		1.4	2	11		5.7	1.4	1	2				8	9.7					5.6			
trichloroethene	3.8	6.2	23	32	15	5	5.7	110	91	60	9.3	24	6.5	5.2		4	7.6	13	4.4	2.5	1.7	
vinyl chloride	1.7	13	190	900	740	580	7.6	7.6	16	14	1.4	12	170	160	540	22	11					
Xylenes (total)				1.3		2.5					6.9			2.9		7.1						
TVOCs	139	1,337	1,267	3,149	1,387	965	190	782	702	607	149	294	4,185	1,061	8,340	356	203	164	106	25	9	5
CVOCs	120	1,337	1,266	3,145	1,387	953	176	779	699	607	91	278	3,724	1,055	8,340	298	195	164	106	25	9	1
PVOCs	0	0	1	1	0	12	9	4	0	0	58	12	462	3	0	58	4	0	0	0	0	0

*prod (0.31 ft)

TABLE 4C
Former Uniforms for Industry Site
129-09 Jamaica Avenue, Richmond Hill, NY
Historic VOC Detections in On-Site Monitoring Wells

Parameter	MW8	MW8	MW8	MW8	MW8	MW9	MW9	MW9	MW9	MW9	MW10	MW10	MW10	MW10	MW10	MW11	MW11	MW11	MW11	MW11	MW12	MW12	MW12	MW12	MW12
ug/L	8/11/2005	4/18/2006	1/17/2007	11/1/2008	9/20/2010	8/11/2005	4/18/2006	1/17/2007	11/1/2008	9/20/2010	8/11/2005	4/18/2006	1/17/2007	11/1/2008	9/20/2010	8/11/2005	4/18/2006	1/17/2007	11/1/2008	9/20/2010	8/11/2005	4/18/2006	1/17/2007	11/1/2008	9/20/2010
1,2,4-trimethylbenzene	prod	N/A	prod (0.69)	prod			N/A	N/A	25		270	N/A	N/A	670	1000	prod	N/A	prod (0.51)	540	490		N/A	N/A		
1,3,5-trimethylbenzene		N/A			3.3		N/A	N/A	9.5		810	N/A	N/A	300	350		N/A		240	46		N/A	N/A		
1-1 Dichloroethene														1.9											
2-Butanone											6.6						2.6		9.3						
2-Hexanone																									
4-Isopropyltoluene		N/A					N/A	N/A				N/A	N/A				N/A					N/A	N/A		
4-Methyl 2-Pentanone																									
Acetone							2.5				40	2.8					6.3		73			2.2			
Benzene		2.7									3.6	7.1	11	7.5			6.8		3.1	4.7					
Chloroform					17																				
Chloroethane																							2.4		
Cis 1-2 DCE		340				28	34	19	10	10	33	25	20	4.7	910		1.1			4.8	1	11	6.7	45	9.6
Ethylbenzene		110			1.2				3.6		57	85	110	100	74		63		42	68					
Isopropylbenzene		N/A					N/A	N/A	2.9		50	N/A	N/A	81	67		N/A		56			N/A	N/A	1.8	2
m/p - xylene		N/A					N/A	N/A	13		210	N/A	N/A	330			N/A		73			N/A	N/A		
Methylene Chloride		4.1			5.2					4.2					6.2		0.049			6.1					4.1
MTBE					29																				
Napthalene		N/A					N/A	N/A			240	N/A	N/A	40	200		N/A		54	400		N/A	N/A		
n-butylbenzene		N/A					N/A	N/A	3.2		25	N/A	N/A	100	40		N/A		78	13		N/A	N/A		
n-propylbenzene		N/A					N/A	N/A	7.6		83	N/A	N/A	210	100		N/A		220	50		N/A	N/A		
o-xylenes		N/A					N/A	N/A	1.2		160	N/A		41			N/A		16			N/A	N/A		
p-diethylbenzene		N/A					N/A	N/A				N/A	N/A				N/A					N/A	N/A		
p-ethyltoluene		N/A					N/A	N/A				N/A	N/A				N/A					N/A	N/A		
p-isopropyltoluene		N/A					N/A	N/A			89	N/A	N/A		36		N/A					N/A	N/A		
sec-butylbenzene		N/A					N/A	N/A			26	N/A	N/A	25	28		N/A		32	11		N/A	N/A	3.3	3
tert-butylbenzene		N/A					N/A	N/A			5.8	N/A	N/A				N/A					N/A	N/A		
tetrachloroethene					1.4	120	200	220	81	81	2.3	6.3		1.2								1.7		1.4	
toluene		45					0.78		2		23	39	30	53	50		3.6								
Trans 1-2 DCE		12					1.1				1.6	1.5	1.5												
trichloroethene					8.7	16	25	20	10	11	18	6.1	4.4												
vinyl chloride		880			6.1						18	150	160	98	1000		43		18		10	51	38	63	19
Xylenes (total)		250					2		14			430	380	370	290		180		89	51					
TVOCs		1,644			72	164	265	259	183	106	2,172	753	717	2,433	4,151		306		1,543	1,145	11	66	47	115	38
CVOCs		1,232			16	164	260	259	101	102	73	189	186	106	1,910		44		18	5	11	64	47	109	29
PVOCs		408			5	0	3	0	82	0	2,059	561	531	2,328	2,235		256		1,452	1,134	0	0	0	5	5

TABLE 5A
Former Uniforms For Industry Site
129-09 Jamaica Avenue, Richmond Hill, NY
Soil Analytical Results
Drainage Pools - VOCs

Samples Collected 9/10

COMPOUND	Track 1 Unrestricted Cleanup Objectives	Restricted Residential Cleanup Objectives	Drywell 1 Sediment	Drywell 1 10 ft	Drywell 2 10 ft	Drywell 3 10 ft	Overflow Pool 2 East Sediment	Overflow Pool 1 East 10 ft	Overflow Pool 1 West Sediment	Overflow Pool 1 West 10 ft
Sample Results in µg/kg	*ug/kg*	*ug/kg*	*ug/Kg*	*ug/Kg*	*ug/Kg*	*ug/Kg*	*ug/Kg*	*ug/Kg*	*ug/Kg*	*ug/Kg*
1,1,1,2-Tetrachloroethane			ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	680	100,000	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane			ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane			ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	270	26,000	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethylene	330	100,000	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloropropylene			ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichlorobenzene			ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichloropropane			ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene			ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	3,600	52,000	ND	ND	ND	ND	**1,600**	ND	**14**	ND
1,2,4,5-Tetramethylbenene			ND	ND	ND	ND	ND	ND	ND	ND
1,2-dibromo-3-chloropropane			ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromoethane			ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	1,100	100,000	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	20	3,100	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane			ND	ND	ND	ND	ND	ND	ND	ND
1,3,5-Trimethylbenzene	8,400	52,000	ND	ND	ND	ND	**1,100**	ND	**5.5** J	ND
1,3-Dichlorobenzene	2,400	49,000	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichloropropane			ND	ND	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1,800	13,000	ND	ND	ND	ND	ND	ND	ND	ND
2,2-Dichloropropane			ND	ND	ND	ND	ND	ND	ND	ND
2-Butanone			ND	ND	ND	ND	ND	ND	ND	ND
2-Chloroethyl vinyl ether			ND	ND	ND	ND	ND	ND	ND	ND
2-Chlorotoluene			ND	ND	ND	ND	ND	ND	ND	ND
2-Hexanone			ND	ND	ND	ND	ND	ND	ND	ND
2-Propanol			ND	ND	ND	ND	ND	ND	ND	ND
4-Chlorotoluene			ND	ND	ND	ND	ND	ND	ND	ND
4-Isopropyltoluene			ND	ND	ND	ND	ND	ND	ND	ND
4-Methyl-2-pentanone			ND	ND	ND	ND	ND	ND	ND	ND
Acetone	50	100,000	ND	ND	ND	ND	ND	ND	ND	ND
Acrolein			ND	ND	ND	ND	ND	ND	ND	ND
Acrylonitrile			ND	ND	ND	ND	ND	ND	ND	ND
Benzene	60	4,800	ND	ND	ND	ND	ND	ND	**5.6** J	ND
Bromobenzene			ND	ND	ND	ND	ND	ND	ND	ND
Bromochloromethane			ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane			ND	ND	ND	ND	ND	ND	ND	ND
Bromoform			ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane			ND	ND	ND	ND	ND	ND	ND	ND
Carbon disulfide			ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	760	2,400	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	1	100,000	ND	ND	ND	ND	ND	ND	ND	ND
Chlorodifluoromethane			ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	1,100		ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	370	49,000	ND	ND	ND	ND	ND	ND	ND	ND
Chloromethane			ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	440	100,000	ND	ND	**4.0** J	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene			ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane			ND	ND	ND	ND	ND	ND	ND	ND
Dibromomethane			ND	ND	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane			ND	ND	ND	ND	ND	ND	ND	ND
Ethanol			ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	1,000	41,000	ND	ND	ND	ND	**18** J	ND	**26**	ND
Hexachlorobutadiene			ND	ND	ND	ND	ND	ND	ND	ND
Isopropylbenzene			ND	ND	ND	ND	**55** J	ND	**2.3** J	ND
MTBE	930	100,000	ND	ND	ND	ND	ND	ND	ND	ND
Methylene chloride	50	100,000	**36** B	**18** JB	**21** JB	**15** JB	**170** B	**18** JB	**25** JB	**16** JB
Naphthalene	12,000	100,000	ND	ND	ND	ND	**190**	ND	**6.4** J	ND
n-Butylbenzene	12,000	100,000	ND	ND	ND	ND	**600**	ND	ND	ND
n-Propylbenzene	3,900	100,000	ND	ND	ND	ND	**170**	ND	ND	ND
o-Xylene	260	100,000	ND	ND	ND	ND	**29** J	ND	**4.1** J	ND
p-&m-Xylenes	260	100,000	**3.1** J	ND	ND	ND	**47** J	ND	**23**	ND
p-Isopropyltoluene			ND	ND	ND	ND	**420**	ND	**69**	ND
sec-Butylbenzene	11,000	100,000	ND	ND	ND	ND	**300**	ND	ND	ND
Styrene			ND	ND	ND	ND	ND	ND	ND	ND
tert-Butylbenzene	5,900	100,000	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethylene	1,300	19,000	**4.6** J	ND	**100**	ND	**16** J	**3.4** J	**54**	ND
Toluene	700	100,000	**3.7** J	ND	ND	ND	ND	ND	**100**	ND
trans-1,2-Dichloroethene			ND	ND	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloroporopylene			ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethylene	470	21,000	ND	ND	**5.6** J	ND	ND	ND	ND	ND
Trichlorofluoromethane			ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	20	900	ND	ND	ND	ND	ND	ND	ND	ND

BOLD	Exceedence of Track 1 Unrestricted Residential Cleanup Objective
BOLD	Exceedence of Restricted Residential Cleanup Objective

TABLE 5B
Former Uniforms For Industry Site
Soil Analytical Results
Drainage Pools - SVOCs

COMPOUND	Track 1 Unrestricted Cleanup Objectives	Restricted Residential Cleanup Objectives	Drywell 1 Sediment	Overflow Pool 2 East Sediment	Overflow Pool 1 West Sediment
Sample Results in µg/kg	*ug/kg*	*ug/kg*	*ug/Kg*	*ug/Kg*	*ug/Kg*
1,2,4-Trichlorobenzene			ND	ND	ND
1,2-Dichlorobenzene			ND	ND	ND
1,3-Dichlorobenzene			ND	ND	ND
1,4-Dichlorobenzene			ND	ND	ND
2,4-Dinitrotoluene			ND	ND	ND
2,6-Dinitrotoluene			ND	ND	ND
2-Chloronaphthalene			ND	ND	ND
2-Methylnaphthalene			ND	ND	ND
3,3'-Dichlorobenzidine			ND	ND	ND
3-Nitroaniline			ND	ND	ND
4-Bromophenyl phenyl ether			ND	ND	ND
4-Chloro-3-methylphenol			ND	ND	ND
4-Chloroaniline			ND	ND	ND
4-Chlorophenyl phenyl ether			ND	ND	ND
4-Nitroaniline			ND	ND	ND
Acenaphthene	20,000	100,000	ND	ND	ND
Acenaphthylene	100,000	100,000	ND	ND	ND
Aniline			ND	ND	ND
Anthracene	100,000	100,000	ND	ND	ND
Benzo(a)anthracene	1,000[f]	1,000	ND	ND	ND
Benzo(a)pyrene	1,000[f]	1,000	ND	ND	ND
Benzo(b)fluoranthene	1,000[f]	1,000	ND	ND	ND
Benzo(g,h,i)perylene	100,000	100,000	ND	ND	ND
Benzo(k)fluoranthene	800	3,900	ND	ND	ND
Butyl benzyl phthalate			ND	ND	ND
Bis(2-chloroethoxy)methane			ND	ND	ND
Bis(2-chloroethyl)ether			ND	ND	ND
Bis(2-chloroisopropyl)ether			ND	ND	ND
Bis(2-ethylhexyl)phthalate			**13,900**	**26,000**	ND
Chrysene	1,000[f]	3,900	ND	ND	ND
Dibenzo(a,h)anthracene	330[e]	330	ND	ND	ND
Dibenzofuran			ND	ND	ND
Diethylphthalate			ND	ND	ND
Dimethylphthalate			ND	ND	ND
Di-n-butylphthalate			ND	ND	ND
Di-n-octylphthalate			ND	ND	ND
Fluoranthene	100,000[a]	100,000	ND	ND	ND
Fluorene	30,000	100,000	ND	ND	ND
Hexachlorobenzene			ND	ND	ND
Hexachlorobutadiene			ND	ND	ND
Hexachlorocyclopentadiene			ND	ND	ND
Hexachloroethane			ND	ND	ND
Indeno(1,2,3-cd)pyrene	500[f]	500	ND	ND	ND
Isophorone			ND	ND	ND
Naphthalene	100,000[a]	12,000	ND	ND	ND
Nitrobenzene			ND	ND	ND
N-Nitrosodiphenylamine			ND	ND	ND
N-Nitrosodi-n-propylamine			ND	ND	ND
Phenanthrene	100,000[a]	100,000	ND	ND	ND
Pyrene	100,000[a]	100,000	ND	ND	ND
Pyridine			ND	ND	ND

Notes:

6 NY`CRR Part 375-6 Remedial Program Soil Cleanup Objectives

The SCOs for residential, restricted-residential and ecological resources use were capped at a maximum value of 100 ppm.

ND - Not-detected

BOLD	Exceedence of Track 1 Unrestricted Residential Cleanup Objective
BOLD	Exceedence of Restricted Residential Cleanup Objective

TABLE 5C
Former Uniforms for Industry Site
129-09 Jamaica Avenue
Soil Analytical Results
Drainage Pools - Metals

COMPOUND	Track 1 Unrestricted Cleanup Objectives	Restricted Residential Cleanup Objectives	Drywell 1 Sediment	Overflow Pool 2 East Sediment	Overflow Pool 1 West Sediment
Sample Results in µg/kg	*ug/kg*	*ug/kg*	*ug/Kg*	*ug/Kg*	*ug/Kg*
Aluminum			**3,350**	**16,000**	**0.49**
Antimony			**3.90**	ND	**1.49**
Arsenic	13	16	**7.31**	**8.04**	**7.96**
Barium	350	400	**45.5**	**193**	**149**
Beryllium	7	72	ND	ND	ND
Cadmium	2.5 c	4	**0.900**	ND	ND
Calcium			**6,010**	**25,900**	**15,200**
Chromium	30 c	180	**46.0**	**30.4**	**29.8**
Cobalt			**8.04**	**10.4**	**10.3**
Copper	50	270	**870**	**51.7**	**173**
Iron			**39,400**	**28,000**	**24,800**
Lead	63 c	400	**89.6**	**153**	**211**
Magnesium			**5,570**	**4,910**	**6,220**
Manganese	1600 c	2,000[f]	**181**	**496**	**457**
Nickel	30	310	**51.9**	**26.7**	**29.4**
Potassium			**505**	**1,000**	**911**
Selenium	3.9c	180	**7.28**	**5.46**	**2.53**
Silver	2	180	ND	ND	ND
Sodium			**497**	**713**	**502**
Thallium			ND	ND	ND
Vanadium			**26.7**	**35.1**	**35.4**
Zinc	109 c	10,000[d]	**927**	**299**	**346**
Mercury	0.18 c	0.81[j]	ND	**0.166**	ND

Notes:

6 NY`CRR Part 375-6 Remedial Program Soil Cleanup Objectives

The SCOs for residential, restricted-residential and ecological resources use were capped at a maximum value of 100 ppm.

[f] - For constituents where the calculated SCO was lower than the rural soil
background concentration as determined by the Department and Department of

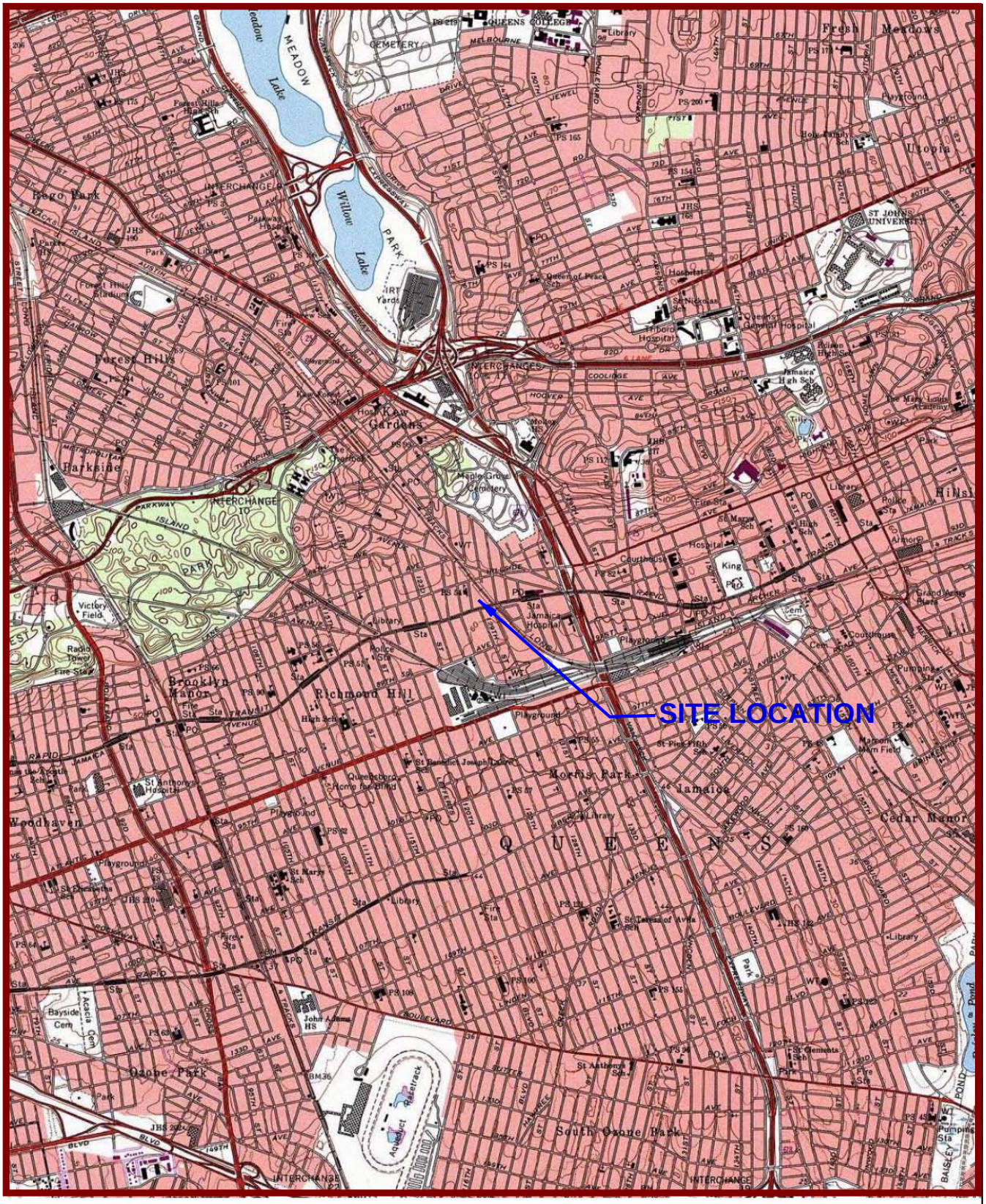
[j] - This SCO is the lower of the values for mercury (elemental) or mercury

[d] -The SCOs for metals were capped at a maximum value of 10,000 ppm

ND - Not-detected

BOLD	Exceedence of Track 1 Unrestricted Residential Cleanup Objective
BOLD	Exceedence of Restricted Residential Cleanup Objective

FIGURES



USGS Jamaica Quadrangle 1994, Contour Interval = 10 feet

0 .5 1 MILES

1000 0 1000 2000 3000 4000 5000 FEET

1 .5 0 KILOMETERS 1

1000 0 METERS 1000

MN 13° 10/19/10

EBC
ENVIRONMENTAL BUSINESS CONSULTANTS

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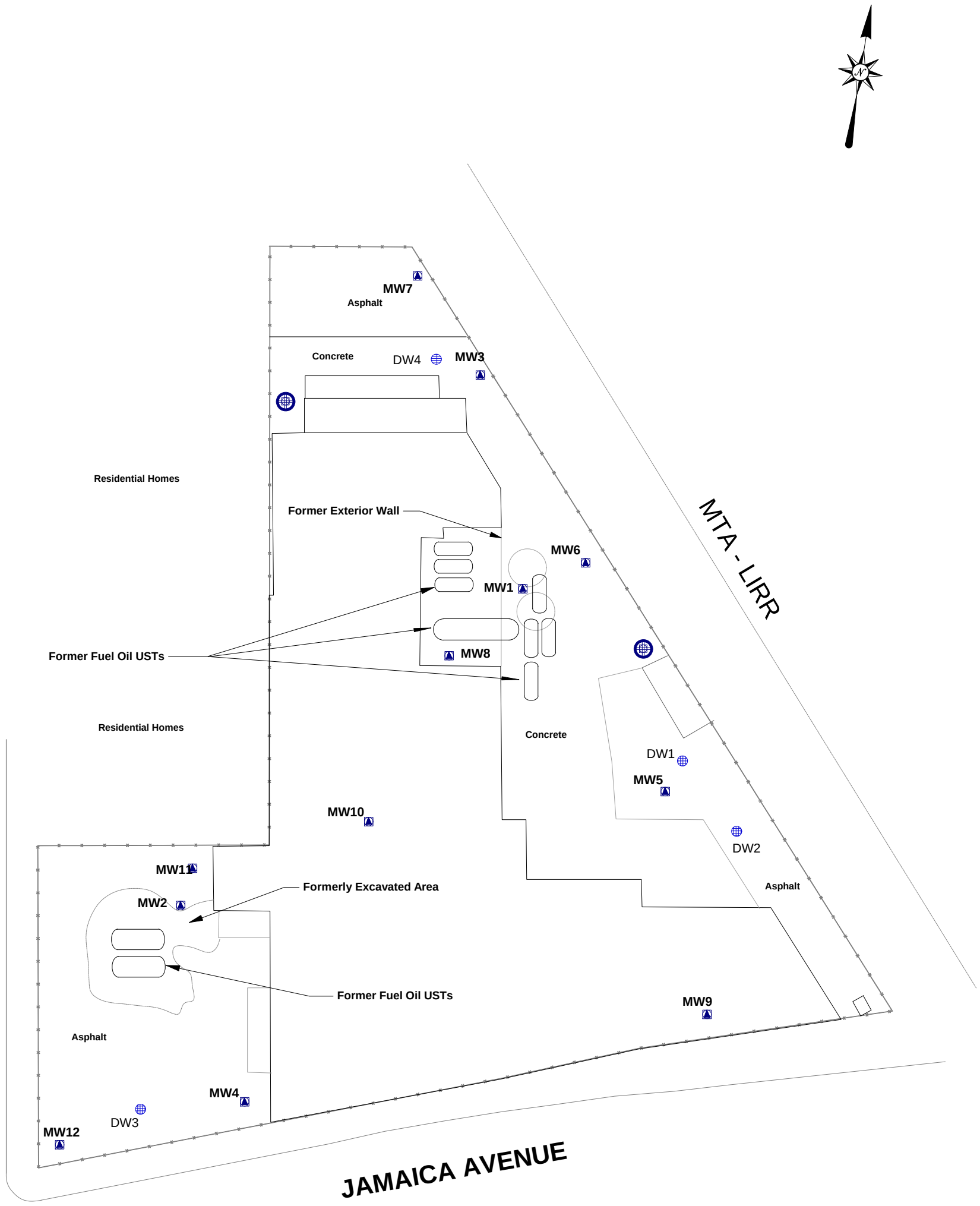
FORMER UNIFORMS FOR INDUSTRY SITE

129-09 JAMAICA AVENUE, RICHMOND HILL, NY

FIGURE 1 SITE LOCATION MAP



KEY:

MWX Monitoring Well

Surface Drain Drywell

Water Supply Well

0 25 50 100

1 Inch = 50 feet

Notes:

The locations of DW4, MW6, MW9 and MW10 not field verified

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Figure No. **2**

Site Name: FORMER UNIFORMS FOR INDUSTRY SITE

Site Address: 129-09 JAMAICA AVENUE, RICHMOND HILL, NY

Drawing Title: SITE PLAN

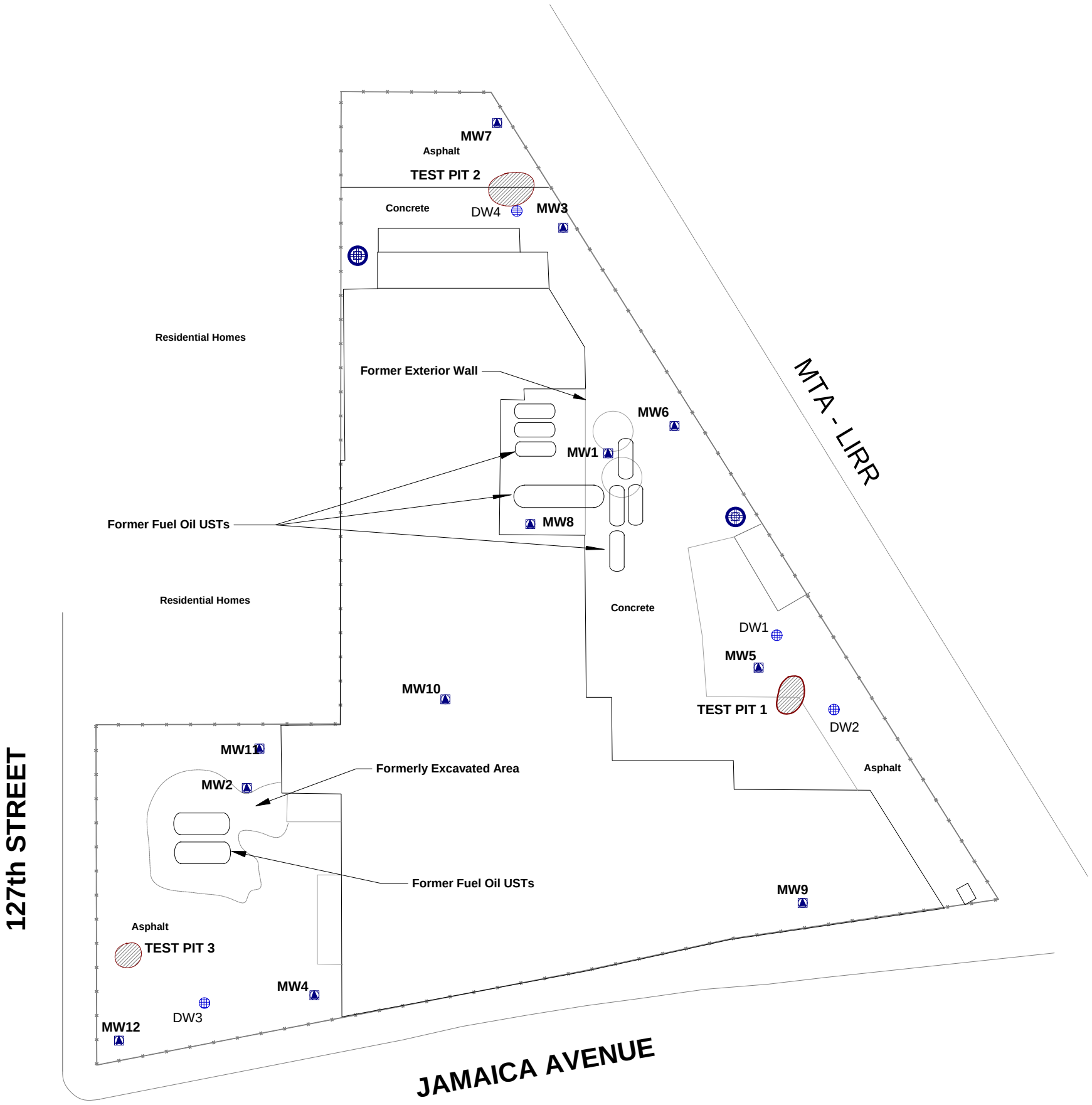

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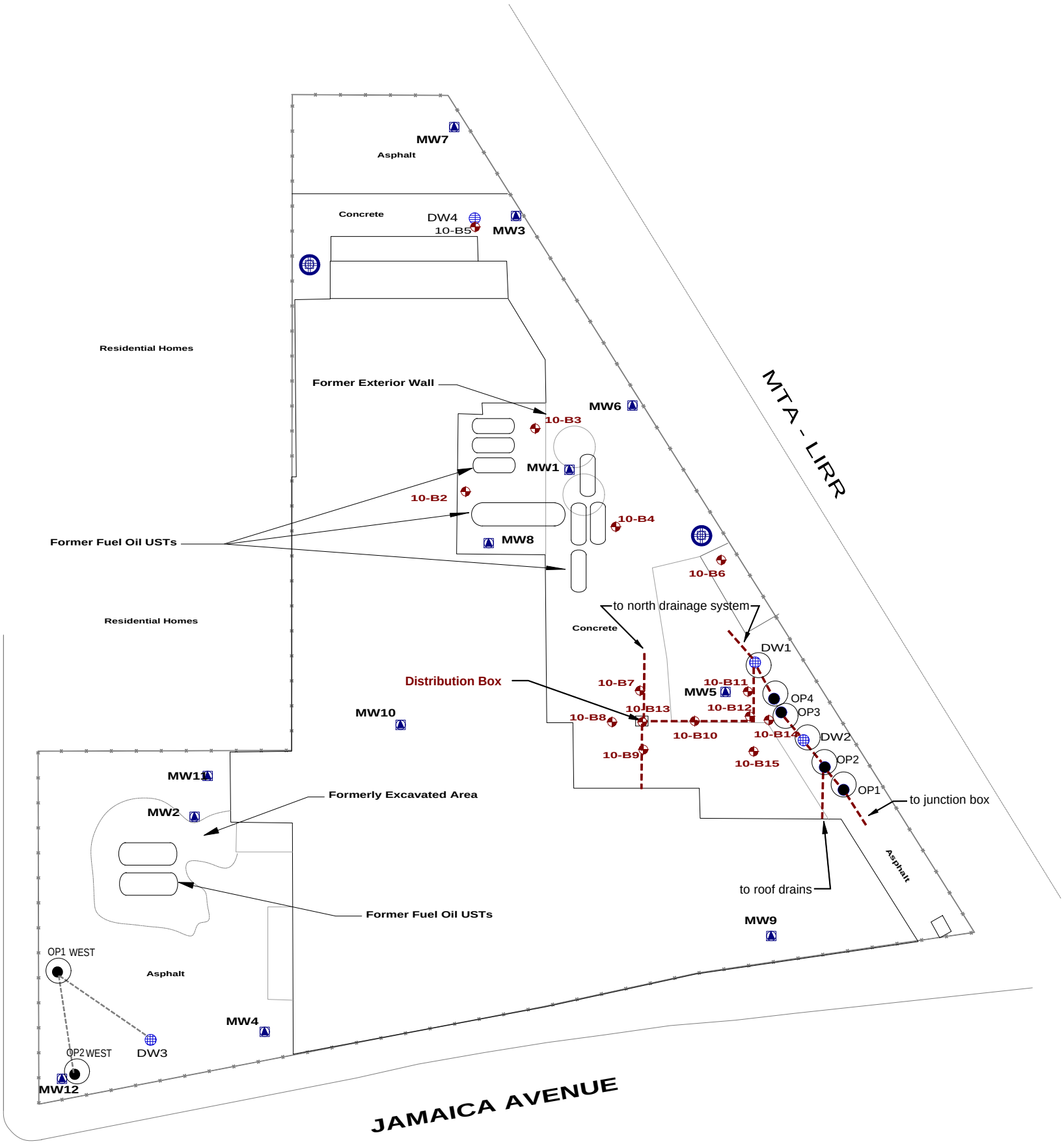
Figure No. 3

Site Name: FORMER UNIFORMS FOR INDUSTRY SITE

Site Address: 129-09 JAMAICA AVENUE, RICHMOND HILL, NY

Drawing Title: TEST PIT LOCATION MAP



Notes:

The locations of DW4, MW6, MW9 and MW10 not field verified

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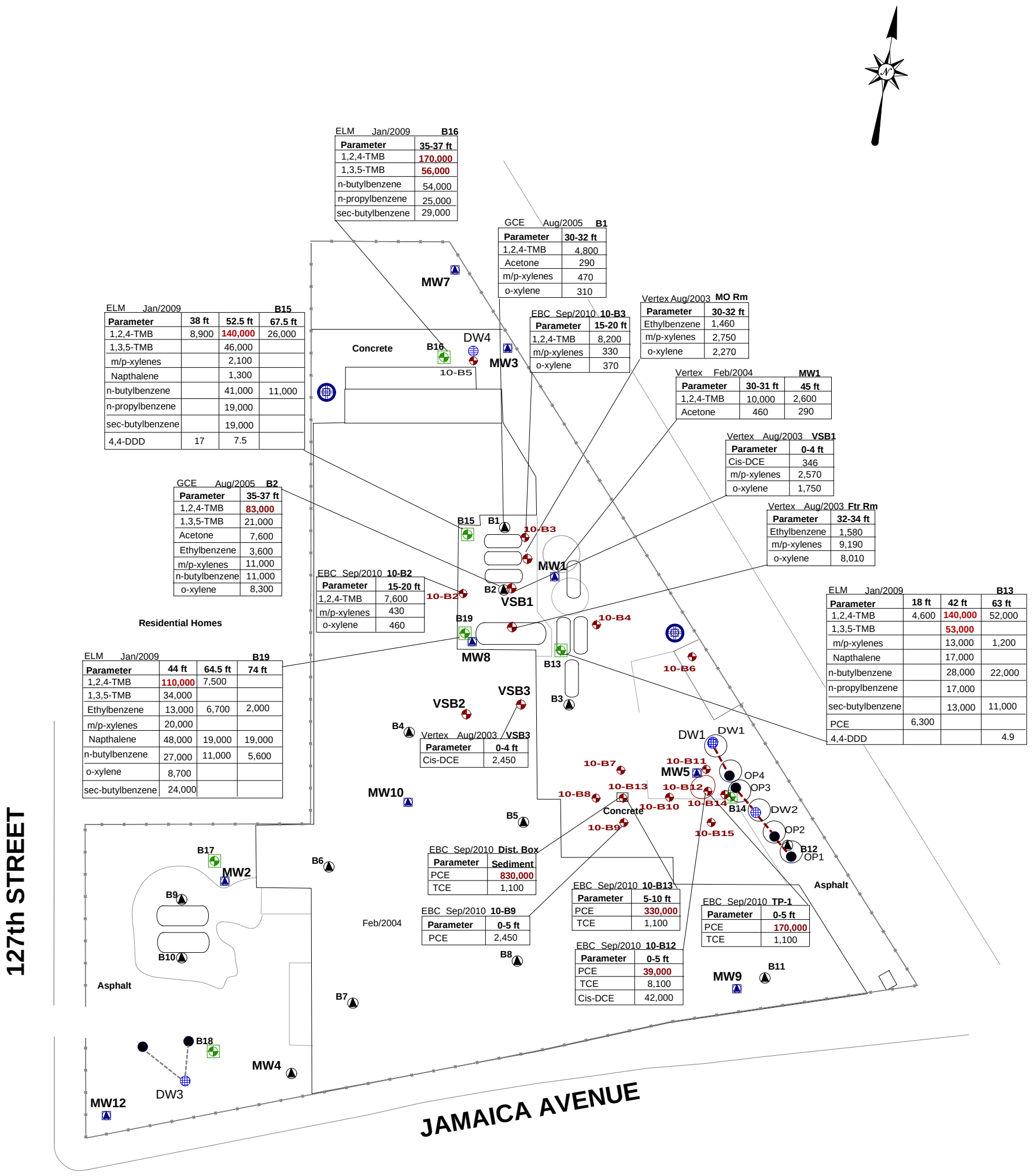
Figure No. 4

Site Name: Former Uniforms For Industry Site

Site Address: 129-09 Jamaica Avenue, Richmond Hill, NY

Drawing Title: Soil Boring Location Map



KEY:

MWX Monitoring Well

Surface Drain Drywell

Suspect Overflow Drywell - No Surface Access

Water Supply Well

Parameter	35-37 ft
1,2,4-TMB	83,000
1,3,5-TMB	21,000
Acetone	7,600
Ethylbenzene	3,600
m/p-xylenes	11,000
n-butylbenzene	11,000
o-xylene	8,300

Notes:

* Samples not analyzed for full suite of petroleum VOCs during this round

All results in ug/kg

All Values indicate exceedance in Unrestricted SCOs

Values in Red indicate exceedance in Restricted Residential SCOs

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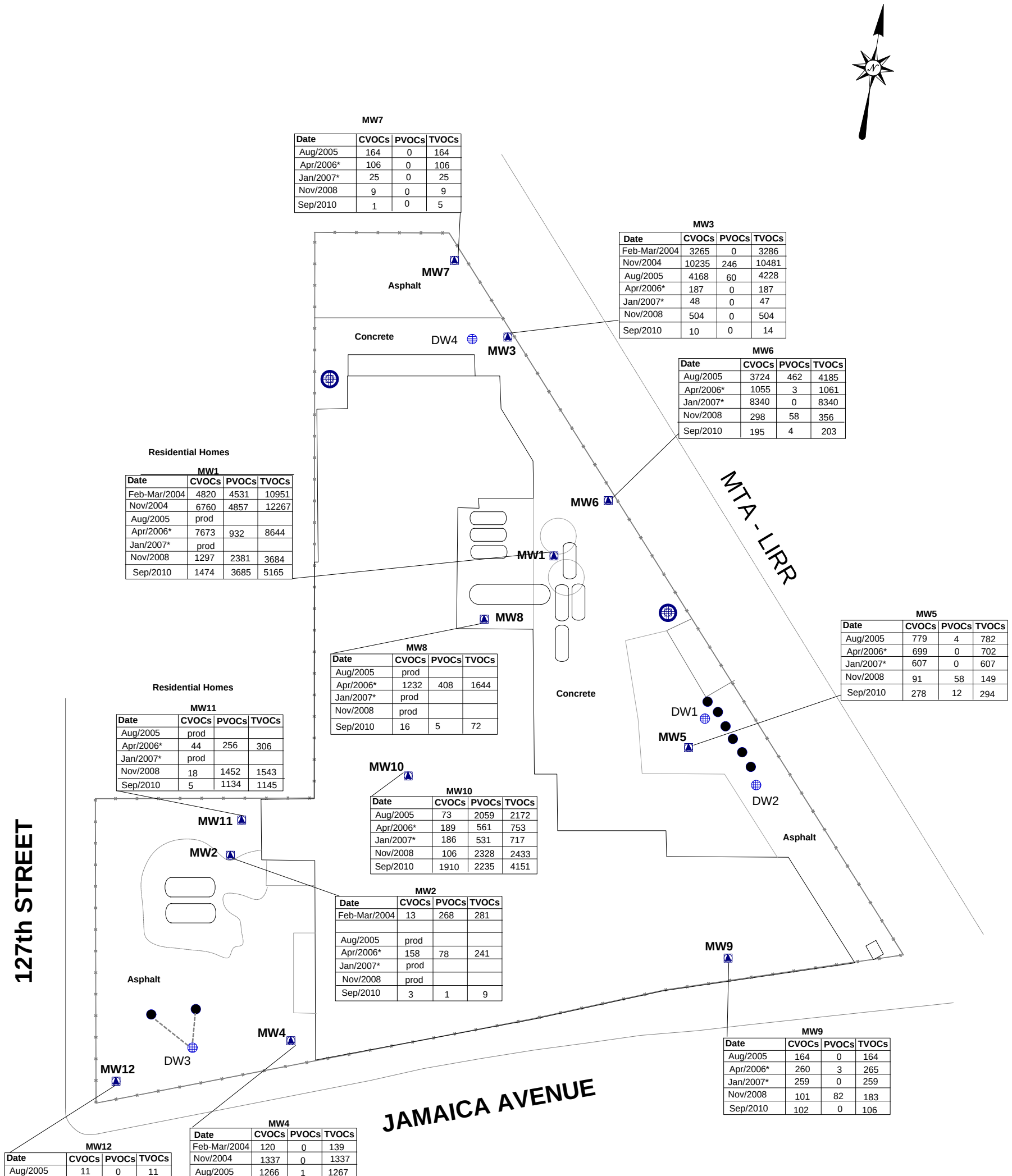
Figure No. 5

Site Name: Former Uniforms For Industry Site

Site Address: 129-09 Jamaica Avenue, Richmond Hill, NY

Drawing Title: Exceedance of Track 1 & Track 4 SCOs



MW7

Date	CVOCs	PVOCs	TVOCs
Aug/2005	164	0	164
Apr/2006*	106	0	106
Jan/2007*	25	0	25
Nov/2008	9	0	9
Sep/2010	1	0	5

MW3

Date	CVOCs	PVOCs	TVOCs
Feb-Mar/2004	3265	0	3286
Nov/2004	10235	246	10481
Aug/2005	4168	60	4228
Apr/2006*	187	0	187
Jan/2007*	48	0	47
Nov/2008	504	0	504
Sep/2010	10	0	14

MW6

Date	CVOCs	PVOCs	TVOCs
Aug/2005	3724	462	4185
Apr/2006*	1055	3	1061
Jan/2007*	8340	0	8340
Nov/2008	298	58	356
Sep/2010	195	4	203

MW1

Date	CVOCs	PVOCs	TVOCs
Feb-Mar/2004	4820	4531	10951
Nov/2004	6760	4857	12267
Aug/2005	prod		
Apr/2006*	7673	932	8644
Jan/2007*	prod		
Nov/2008	1297	2381	3684
Sep/2010	1474	3685	5165

MW8

Date	CVOCs	PVOCs	TVOCs
Aug/2005	prod		
Apr/2006*	1232	408	1644
Jan/2007*	prod		
Nov/2008	prod		
Sep/2010	16	5	72

MW5

Date	CVOCs	PVOCs	TVOCs
Aug/2005	779	4	782
Apr/2006*	699	0	702
Jan/2007*	607	0	607
Nov/2008	91	58	149
Sep/2010	278	12	294

MW11

Date	CVOCs	PVOCs	TVOCs
Aug/2005	prod		
Apr/2006*	44	256	306
Jan/2007*	prod		
Nov/2008	18	1452	1543
Sep/2010	5	1134	1145

MW10

Date	CVOCs	PVOCs	TVOCs
Aug/2005	73	2059	2172
Apr/2006*	189	561	753
Jan/2007*	186	531	717
Nov/2008	106	2328	2433
Sep/2010	1910	2235	4151

MW2

Date	CVOCs	PVOCs	TVOCs
Feb-Mar/2004	13	268	281
Aug/2005	prod		
Apr/2006*	158	78	241
Jan/2007*	prod		
Nov/2008	prod		
Sep/2010	3	1	9

MW9

Date	CVOCs	PVOCs	TVOCs
Aug/2005	164	0	164
Apr/2006*	260	3	265
Jan/2007*	259	0	259
Nov/2008	101	82	183
Sep/2010	102	0	106

MW12

Date	CVOCs	PVOCs	TVOCs
Aug/2005	11	0	11
Apr/2006*	64	0	66
Jan/2007*	47	0	47
Nov/2008	109	0	115
Sep/2010	29	5	38

MW4

Date	CVOCs	PVOCs	TVOCs
Feb-Mar/2004	120	0	139
Nov/2004	1337	0	1337
Aug/2005	1266	1	1267
Apr/2006*	3145	1	3149
Jan/2007*	1387	0	1387
Nov/2008	953	12	965
Sep/2010	176	9	190

KEY:

MWX Monitoring Well

Surface Drain Drywell

Suspect Overflow Drywell - No Surface Access

Water Supply Well

0 25 50 100

1 Inch = 50 feet

Notes:

* Samples not analyzed for full suite of petroleum VOCs during this round

All results in ug/L

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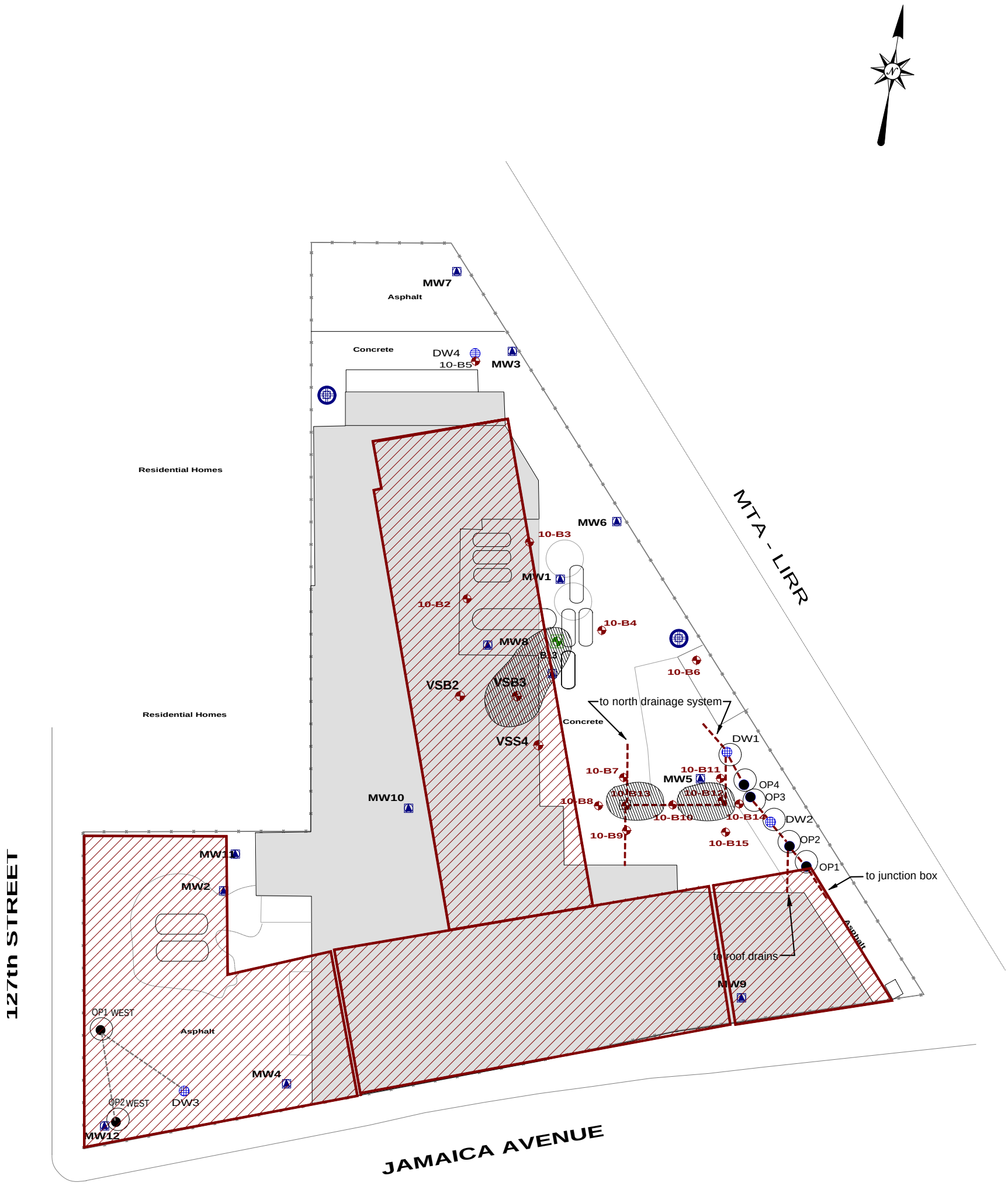
Figure No. **6**

Site Name: FORMER UNIFORMS FOR INDUSTRY SITE

Site Address: 129-09 JAMAICA AVENUE, RICHMOND HILL, NY

Drawing Title: HISTORIC GROUNDWATER RESULTS



KEY:

MWX

- Monitoring Well
- Surface Drain Drywell
- Suspect Overflow Drywell - No Surface Access
- Water Supply Well

0 25 50 100

1 Inch = 50 feet

Notes:

The locations of DW4, MW6, MW9 and MW10 not field verified

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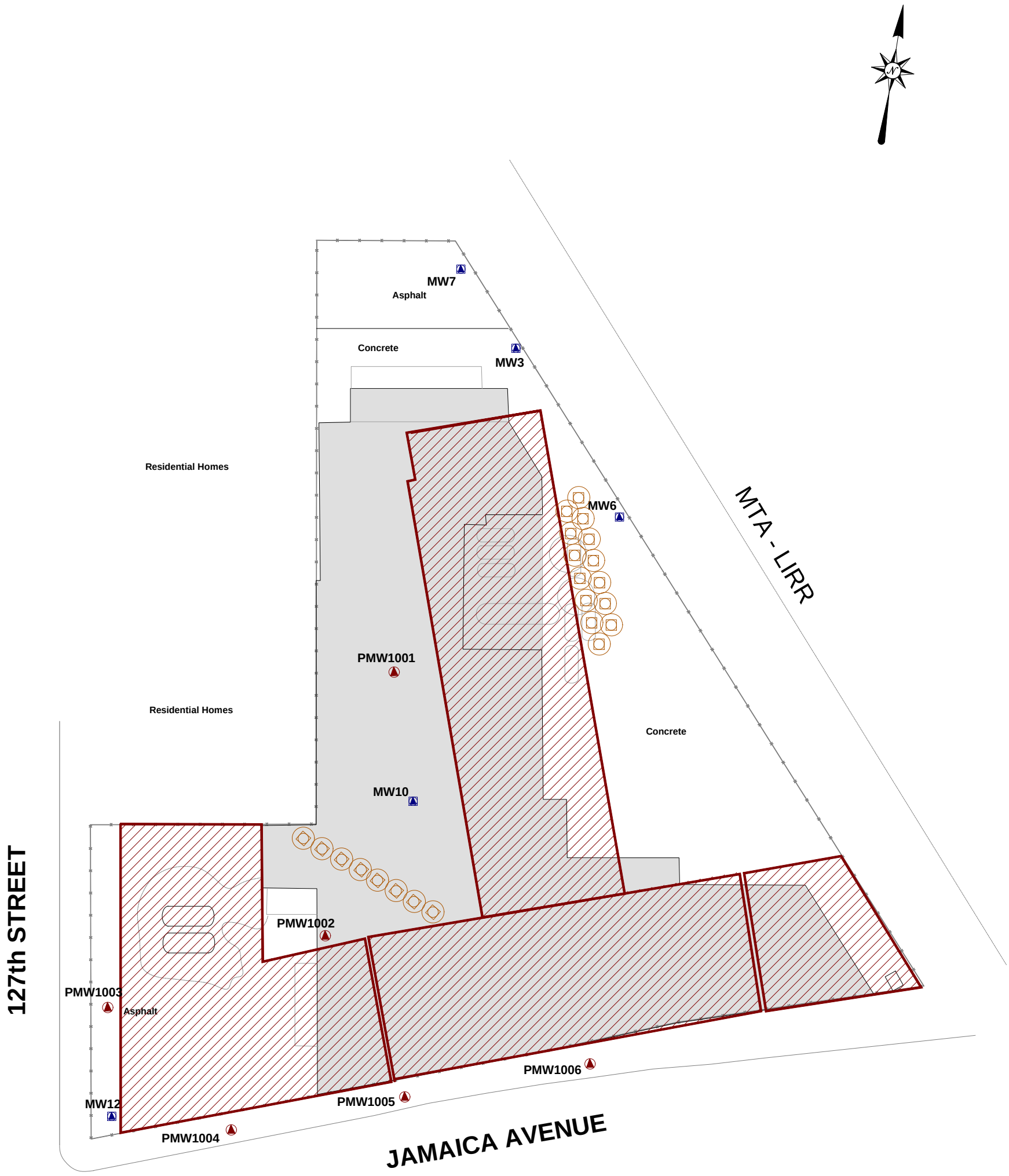
Figure No.
7

Site Name: FORMER UNIFORMS FOR INDUSTRY SITE

Site Address: 129-09 JAMAICA AVENUE, RICHMOND HILL, NY

Drawing Title: HOT SPOT EXCAVATION PLAN



KEY:

MWX Existing Monitoring Well

PMW10XX Proposed Monitoring Well

Chemical Oxidant Injection Well (5 ft inj. radius)

Surface Drain Drywell

0 25 50 100

1 Inch = 50 feet

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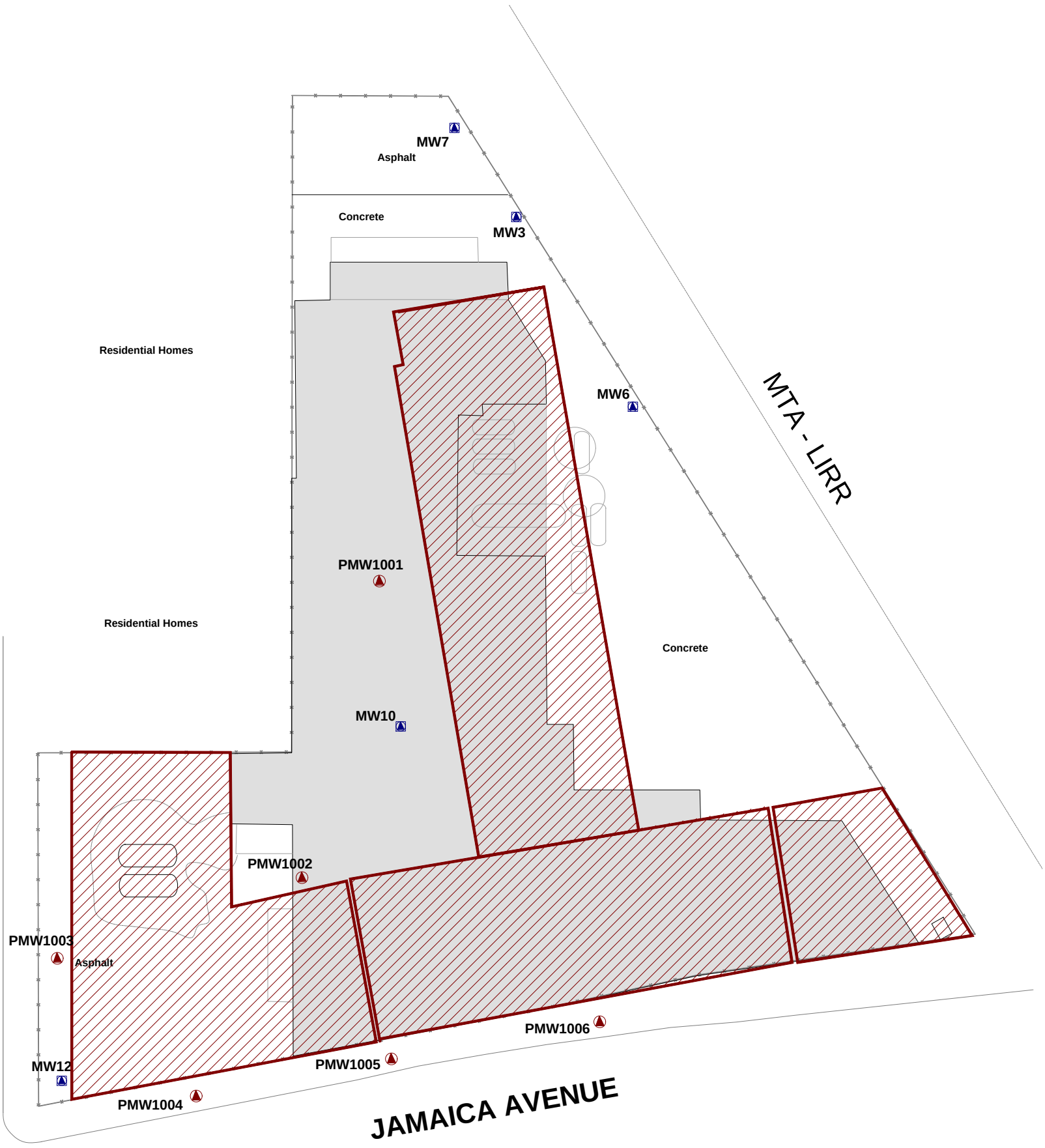
Figure No.
8

Site Name: FORMER UNIFORMS FOR INDUSTRY SITE

Site Address: 129-09 JAMAICA AVENUE, RICHMOND HILL, NY

Drawing Title: CHEMICAL OXIDANT INJECTION PLAN



KEY:

MWX Existing Monitoring Well

PMW10XX Proposed Monitoring Well

0 25 50 100

1 Inch = 50 feet

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Figure No.
9

Site Name: FORMER UNIFORMS FOR INDUSTRY SITE

Site Address: 129-09 JAMAICA AVENUE, RICHMOND HILL, NY

Drawing Title: GROUNDWATER MONITORING PLAN

ATTACHMENT A
ARCHITECTURAL PLANS

PROPOSED NEW DEVELOPMENT FOR:

RICHMOND HILL SENIOR LIVING RESIDENCE

QUEENS, NEW YORK

ZONING CALCULATION

Address:	129-01 / 129-09 Jamaica Ave @ 127th St.			CONST. CLASS 1-B 2HR RATED
Block:	9821			ZONING USE GROUP - 2
Lot:	44			BUILDING CODE OCCUPANCY GROUP - R-2
Zoning:	R5/C2-3, R6A/C2-4			BUILDING TO BE FULLY SPRINKLERED
				BUILDING TO BE DESIGNED PER 2008 NYC BUILDING CODE
				DENSITY CALC: LOT = 1.7 ACRES = 38 UNITS PER ACRE
Map	14b		Non-Profit Res. For Elderly Reqd. Accesory Social & Welfare Facilities 4% Min	

RESIDENTIAL

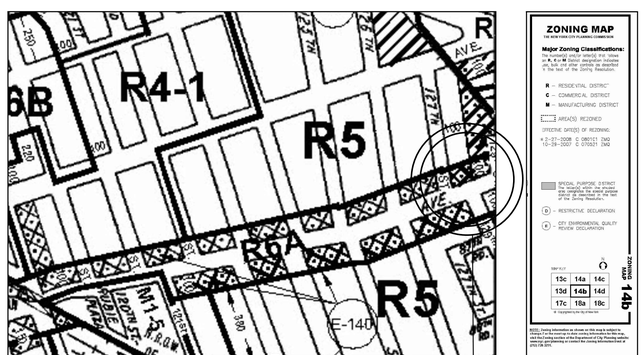
	PERMITTED/REQUIRED		PROPOSED		REMARKS	RES.
Lot area						
R5						
Narrow Interior Lot			39,431.00	Sq.Ft.		
R6A						23-32
Corner Lot			10,154.10	Sq.Ft.		
Wide Interior Lot			24,621.20	Sq.Ft.		
	1,700.00	Sq.Ft.	**74,206.30**	**Sq.Ft.**	OK	
Lot Coverage						
Corner Lot 80%	8,123.28	Sq.Ft.	6,841.00		OK	23-145
Interior Lot 65%	41,633.93	Sq.Ft.	5,248.00		OK	23-145
F.A.R. Floor Area Ratio						
R5	1.25	Max.	0.07		OK	23-141
R6A	3.90	Max.	1.72		OK	23-147
Adjusted	2.49	Max.	**0.84**		OK	
Gross Floor Area						
R5	49,288.75		2,671.00		OK	23-141
R6A	135,823.67		59,866.00		OK	23-145
Total	184,912.42	Max.	**62,537.00**	**Sq.Ft.**	OK	
No. of Apartments						
R5 760 Min.	65	Units (Max.)	5	D.U.	OK	
R6A 680 Min.	199	Units (Max.)	60	D.U.	OK	23-22
Total	264	Units (Max.)	65	D.U.	OK	
Heights (feet)						
R5						
Max. Base Height		30'-0"		30'-0"	OK	23-631
Max Building Height		40'-0"		40'-0"	OK	23-631
R6A						
Min. Base Height		40'-0"		60'-0"	OK	23-633
Max. Base Height		60'-0"		60'-0"	OK	23-633
Max Building Height		70'-0"		60'-0"	OK	23-633
Special Provisions in R6 adjacent to lots entirley or partially in R5	Within 25' of the lot line of a lot enirely or patially in R5 our building cannot exceed a height of 35'-0"			30'-0"	OK	23-51
Yard Regulations						
R5						
Front	10'-0"	Min	10'-0"		OK	23-45
Side	8'-0"	Min	8'-0"		OK	23-51
Rear	30'-0"	Min	30'-0"		OK	23-47
R6A						
Front	Not req'd					23-45
Side	Not req'd					23-462c
Rear	30'-0"	Min	30'-0"		OK	23-47
Initial Set Back						
Wide Street	10'-0"		N/A		OK	23-633
Narrow Street	15'-0"		N/A		OK	23-633
Non-Profit Res. For Elderly Reqd. Accesory Social & Welfare Facilities 4% Min	2,501	Sq.Ft. Min	2,545	Sq.Ft.	OK	12-10

PARKING

	PERMITTED/REQUIRED		PROPOSED		REMARKS	RES.
NON PROFIT RESIDENCE FOR THE ELDERY AS DEFINED IN ZR 12-10						
R5 31.5%	2					25-25
R6A 16%	10					25-25
Total Req.	12	Spaces	**12**	**Spaces**	OK	25-261
Bicycle Parking						
1 Space per 10,000Sq.Ft.	6	Spaces (Min.)	6	Spaces	OK	25-811
15 Sq.Ft. per Bicicle	90	Sq.Ft. Min	90	Sq.Ft.	OK	

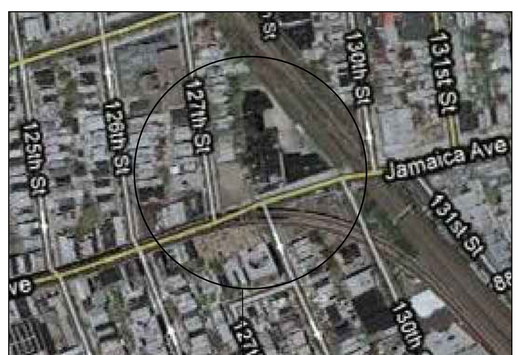
VIEW AT INTERSECTION OF JAMAICA AVENUE & 127TH STREET

NOT TO SCALE



ZONING MAP

NOT TO SCALE



AERIAL MAP

NOT TO SCALE

DRAWING SCHEDULE

A	COVER SHEET
A-001.00	SITE PLAN & TRANSPORTATION MAPS
A-101.00	CELLAR FLOOR PLAN
A-102.00	1ST FLOOR PLAN
A-103.00	2ND & 3RD FLOOR PLAN
A-104.00	4TH & 5TH FLOOR PLAN
A-105.00	6TH FLOOR PLAN
A-106.00	ROOF PLAN, BULKHEAD FLOOR & ROOF PLANS
A-201.00	EXTERIOR ELEVATION
A-202.00	EXTERIOR ELEVATION
A-203.00	EXTERIOR ELEVATION
A-204.00	EXTERIOR ELEVATION
A-301.00	TYPICAL WALL SECTION

APARTMENT DISTRIBUTION

TYPE	1 BR. APTS.	2 BR. APTS.	TOTAL
FIRST FLOOR	8	-	8
SECOND FLOOR	13	1	14
THIRD FLOOR	13	1	14
FOURTH FLOOR	11	1	12
FIFTH FLOOR	11	1	12
SIXTH FLOOR	4	1	5
TOTAL	60	5	65

RICHMOND HILL HOUSING LIMITED PARTNERSHIP
15 VERBENA AVENUE
FLORAL PARK, NY 11001

DEVELOPER:

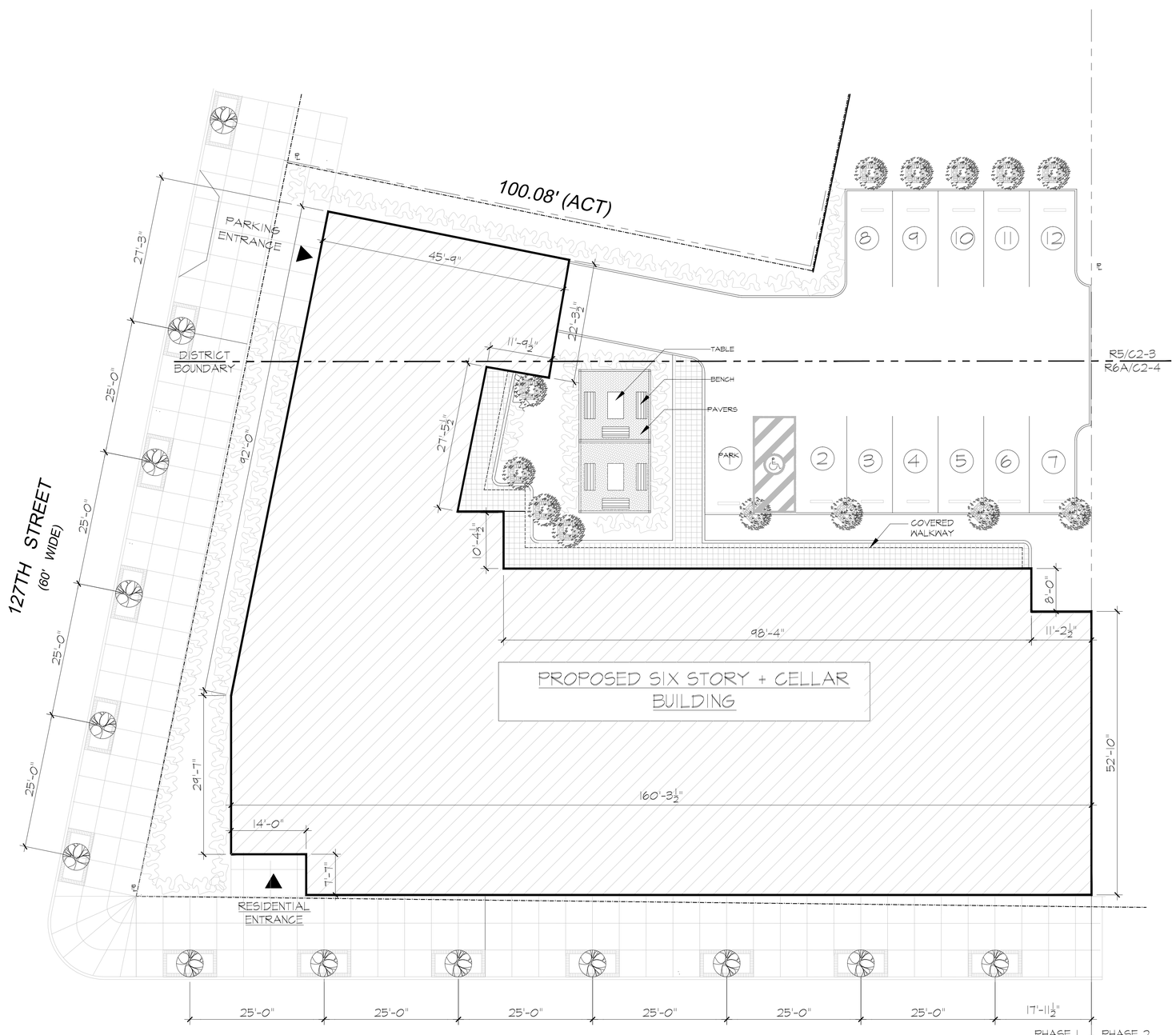
THE ARKER COMPANIES
15 VERBENA AVE.
SUITE 100
FLORAL PARK, NY 11001
TEL: 516-277-9300
FAX: (516) 374-3326

ARCHITECT:

HUGO S. SUBOTOVSKY AIA architects LLC
49 N. AIRMONT ROAD, SUFFERN, NY 10901 TEL: 845-368-0004 FAX: 845-368-0005
121 WEST 27TH STREET, NEW YORK,NY 10001 TEL: 212-242-5321 FAX: 800-772-8304

02-05-10 ISSUED TO DHCR FOR REVIEW

A



SITE PLAN

SCALE : 3/32" = 1'-0"

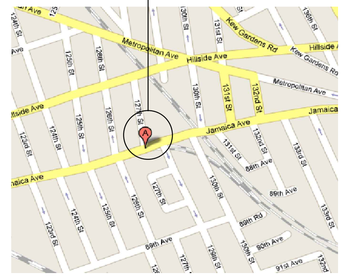
PROJECT SITE

FLOOD MAP

NOT TO SCALE

NOTE:
STORM WATER TO BE CAPTURED AND STORED ON ROOF SURFACES AND PURGED INTO SEWER SYSTEM AT AN ACCEPTABLE RATE

PROJECT SITE



VICINITY MAP

NOT TO SCALE

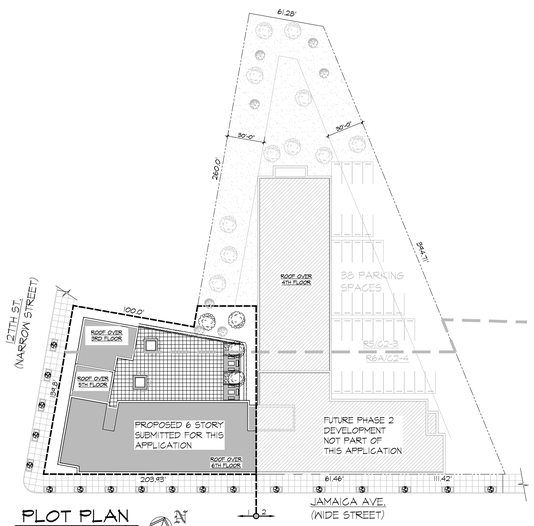
PROJECT SITE

N.Y.C. BUS MAP

NOT TO SCALE

N.Y.C. SUBWAY MAP

NOT TO SCALE



PLOT PLAN

NOT TO SCALE

GENERAL NOTES

1. USE ENERGY STAR APPLIANCES, LIGHT FIXTURES AND HEATING SYSTEMS OR THE EQUIVALENT WHICH WILL PRODUCE THE SAME OR COMPARABLE ENERGY EFFICIENCY OR SAVINGS.
2. SELECT NATIVE OR NON INVASIVE NEW TREES AND PLANTS THAT ARE APPROPRIATE TO THE SITE'S SOIL AND MICROCLIMATE.
3. INSTALL WATER CONSERVING FIXTURES THROUGHOUT.
4. USE DAYLIGHT SENSORS OR TIMERS ON OUTDOOR LIGHTING TO MAXIMIZE ENERGY EFFICIENCY.
5. ALL INTERIOR PAINTS, PRIMERS, ADHESIVES AND SEALANTS MUST CONTAIN LOW OR NO VOCS.
6. GREEN LABEL CERTIFIED FLOOR COVERING: DO NOT INSTALL CARPETS IN BELOW GRADE LIVING SPACES, ENTRYWAYS, LAUNDRY ROOMS, BATHROOMS, KITCHENS OR UTILITY ROOMS. IF USING CARPET, USE PRODUCTS THAT MEET THE CARPET AND RUG INSTITUTE'S GREEN LABEL CERTIFIED CARPET, PAD AND CARPET ADHESIVES.
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10. WATER HEATERS: MINIMIZING CO: SPECIFY DIRECT VENTED OR COMBUSTION SEALED WATER HEATERS IF THE HEATER IS LOCATED IN A CONDITIONED SPACE.
11. COLD WATER PIPE INSULATION: INSULATE EXPOSED COLD WATER PIPES.
12. MATERIALS IN WET AREAS: USE MATERIALS WITH SMOOTH, DURABLE, CLEANABLE SURFACES. DO NOT USE MOLD - PROPAGATING MATERIALS SUCH AS VINYL WALLPAPER AND UNSEALED GROUT.
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14. INTEGRATED PEST MANAGEMENT: SEAL ALL WALL, FLOOR AND JOINT PENETRATIONS TO PREVENT PEST ENTRY. PROVIDE RODENT AND CORROSION PROOF SCREENS (E.G., COPPER OR STAINLESS STEEL MESH) FOR LARGE OPENINGS.
15. REDUCED HEAT - ISLAND EFFECT: ROOFING AND PAVING: 1) USE ENERGY-STAR COMPLIANT AND HIGH - EMISSIVE ROOFING FOR THE ENTIRE ROOF 2) USE LIGHT - COLORED/HIGH - ALBEDO MATERIALS FOR HARDSCAPED AREAS.
16. PROVIDE SOUND ATTENUATION BATT INSULATION IN ALL WALLS BETWEEN LIVING ROOMS AND BEDROOMS AND IN ALL TENANT SEPARATION PARTITIONS THROUGHTOUT (TYP.)
17. ALL APARTMENT UNITS ARE HANDICAP ADAPTABLE UNLESS OTHERWISE NOTED

DATE	REVISIONS
02-05-10	ISSUED TO DHCR FOR REVIEW

HUGO S. SUBOTOVSKY AIA
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121 WEST 27TH STREET, NEW YORK,NY 10001 TEL: 212-242-5321 FAX: 800-772-8304

PROPOSED NEW DEVELOPMENT FOR:
RICHMOND HILL SENIOR LIVING RESIDENCE
129-09 JAMAICA AVENUE,QUEENS, NEW YORK

SITE PLAN & TRANSPORTATION MAPS

DATE:	1/25/10
PROJECT NO:	0924
DRAWN BY:	AR
CHECKED BY:	
DRAWING NO:	A-001.00
SCALE: AS NOTED	SHEET NO: 2 OF 13
NYC DOB NUMBER:	

0434-A-001.00

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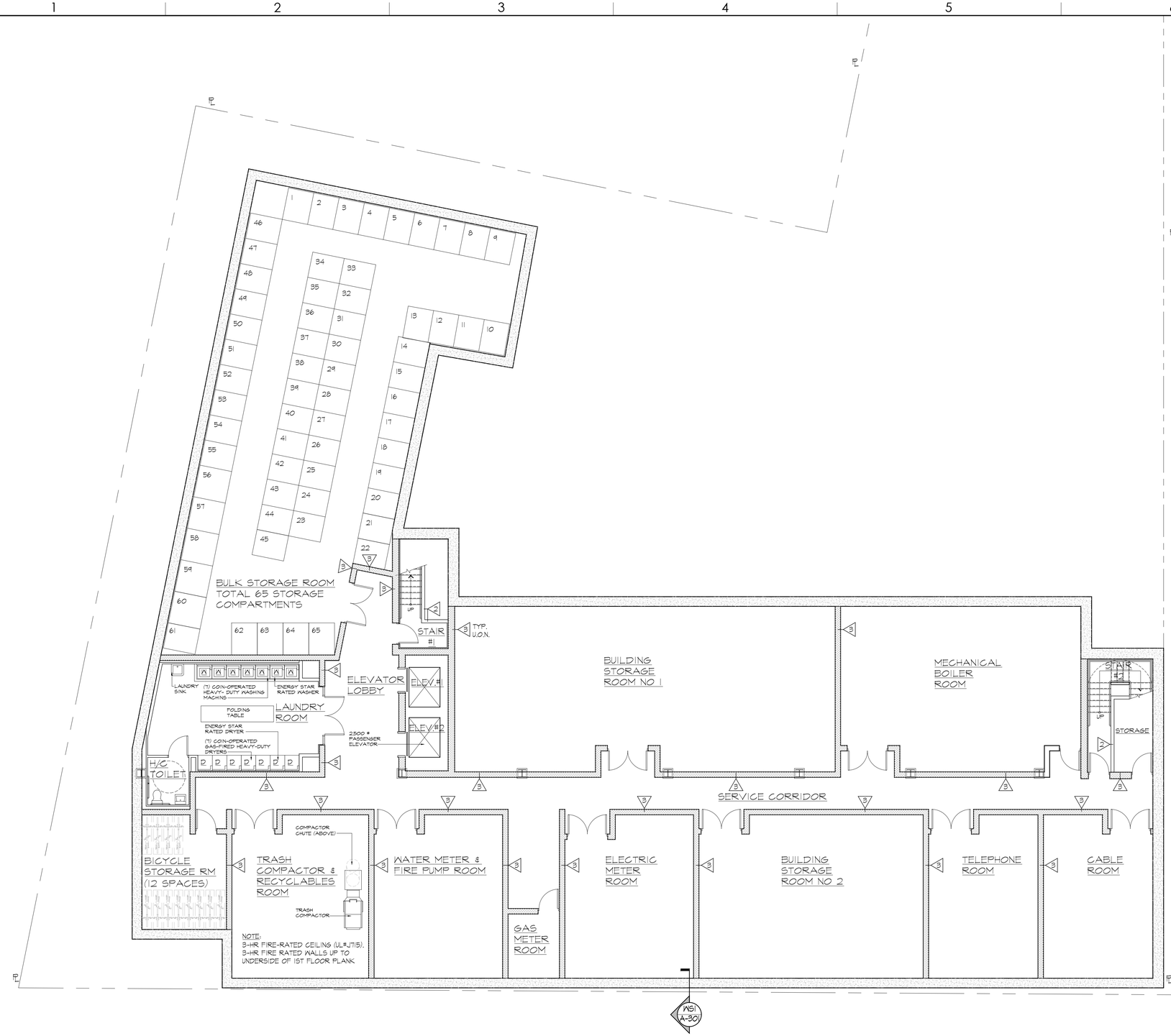

CELLAR FLOOR PLAN

SCALE : 1/8" = 1'-0"

N

0434-A-101

GENERAL NOTES

1. USE ENERGY STAR APPLIANCES, LIGHT FIXTURES AND HEATING SYSTEMS OR THE EQUIVALENT WHICH WILL PRODUCE THE SAME OR COMPARABLE ENERGY EFFICIENCY OR SAVINGS.
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16. PROVIDE SOUND ATTENUATION BATT INSULATION IN ALL WALLS BETWEEN LIVING ROOMS AND BEDROOMS AND IN ALL TENANT SEPARATION PARTITIONS THROUGHTOUT (TYP.)
17. ALL APARTMENT UNITS ARE HANDICAP ADAPTABLE UNLESS OTHERWISE NOTED

WALL TYPE LEGEND:

1 HOUR RATED TENANT SEPARATION PARTITION - (1) LAYER OF 5/8" TYPE "X" GYPSUM BOARD ON (1) SIDE, (2) LAYERS OF 5/8" TYPE "X" GYPSUM BOARD ON OTHER SIDE OF 3-5/8" METAL STUDS @ 16" O.C. WITH 3-1/2" SOUND ATTENUATION INSULATION. EXTEND STUDS & GYPSUM BOARD UP TO UNDERSIDE OF CONCRETE DECK & SEAL TIGHT TO UNDERSIDE OF CONCRETE DECK AND/OR ROOF DECK W/ FIRESTOP SEALANT, WHICH EVER IS APPLICABLE. (GA FILE #WP-1052) (STC 50-54)

2 HOUR RATED PARTITION - (2) LAYERS 5/8" TYPE "X" GYPSUM BOARD ON EACH SIDE OF 3-5/8" 20 GAUGE METAL STUDS @ 16" O.C. WITH 3-1/2" SOUND ATTENUATION INSULATION. EXTEND GYPSUM BOARD & STUDS UP TO UNDERSIDE OF FLOOR DECK OR ROOF DECK. SEAL TIGHT TO DECK WITH FIRESTOP SEALANT. (GA FILE #AP-1522 STC 55-59).

3 2 HOUR RATED CONCRETE BLOCK WALL WITH GALVANIZED HORIZONTAL TRUSS TYPE REINFORCING AT ALTERNATE COURSES. SEAL TOP OF CONCRETE BLOCK WALL TIGHT TO UNDERSIDE OF CONCRETE PLANK OR DECK ABOVE WITH FIRESTOP SEALANT AND/OR FIRESAFING INSULATION AS REQUIRED (UL #906)

LEGEND:

CONCRETE FOUNDATION WALL

CONCRETE BLOCK WALL

H.V.I. UNIT DESIGNATED & OUTFITTED AS FULLY ACCESSIBLE FOR PERSONS WITH HEARING OR VISION IMPAIRMENT. (3 UNITS)

UNIT DESIGNATED & OUTFITTED AS FULLY ACCESSIBLE & ADAPTED, MOVE IN READY, FOR PERSONS WITH A MOBILITY IMPAIRMENT. (7 UNITS)

H.P. HEAT PUMPS (ENERGY-STAR RATED)

E.P.C. EMERGENCY PULL CHORD

DATE	REVISIONS
02-05-10	ISSUED TO DHCR FOR REVIEW

HUGO S. SUBOTOVSKY AIA
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121 WEST 27TH STREET, NEW YORK,NY 10001 TEL: 212-242-5321 FAX: 800-772-8304

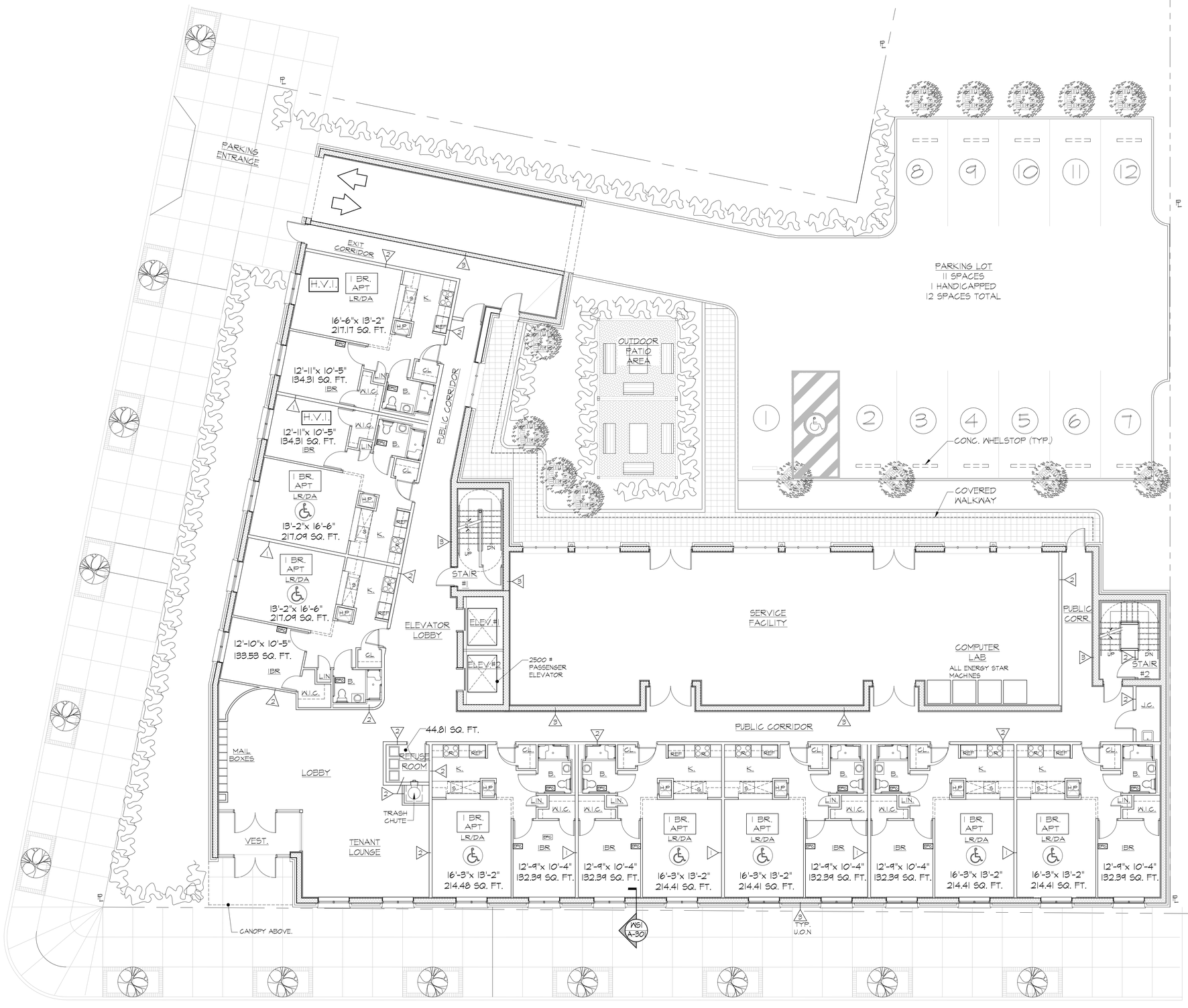
PROPOSED NEW DEVELOPMENT FOR:

RICHMOND HILLS SENIOR LIVING RESIDENCE

JAMAICA AVENUE AND 127 STREET, QUEENS, NEW YORK

CELLAR FLOOR PLAN

DATE:	01-25-10
PROJECT NO:	0924
DRAWN BY:	AR
CHECKED BY:	
DRAWING NO:	A-101.00
SCALE: AS NOTED	SHEET NO: 3 OF13
NYC DOB NUMBER:	



1ST. FLOOR PLAN

SCALE : 1/8" = 1'-0"

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LEGEND:

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- CONCRETE BLOCK WALL
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- UNIT DESIGNATED & OUTFITTED AS FULLY ACCESSIBLE & ADAPTED, MOVE IN READY, FOR PERSONS WITH A MOBILITY IMPAIRMENT. (1 UNITS)
- H.P. — HEAT PUMPS (ENERGY-STAR RATED)
- E.P.C. — EMERGENCY PULL CHORD

DATE	REVISIONS
02-05-10	ISSUED TO DHCR FOR REVIEW

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PROPOSED NEW DEVELOPMENT FOR:

RICHMOND HILL SENIOR LIVING RESIDENCE

129-09 JAMAICA AVENUE, QUEENS, NEW YORK

FIRST FLOOR PLAN

DATE:	01-25-10
PROJECT NO:	0924
DRAWN BY:	AR
CHECKED BY:	
DRAWING NO:	A-102.00
SCALE: AS NOTED	SHEET NO: 4 OF 13
NYC DOB NUMBER:	

0434-A-102

2ND & 3RD FLOOR PLAN

SCALE : 1/8" = 1'-0"

N

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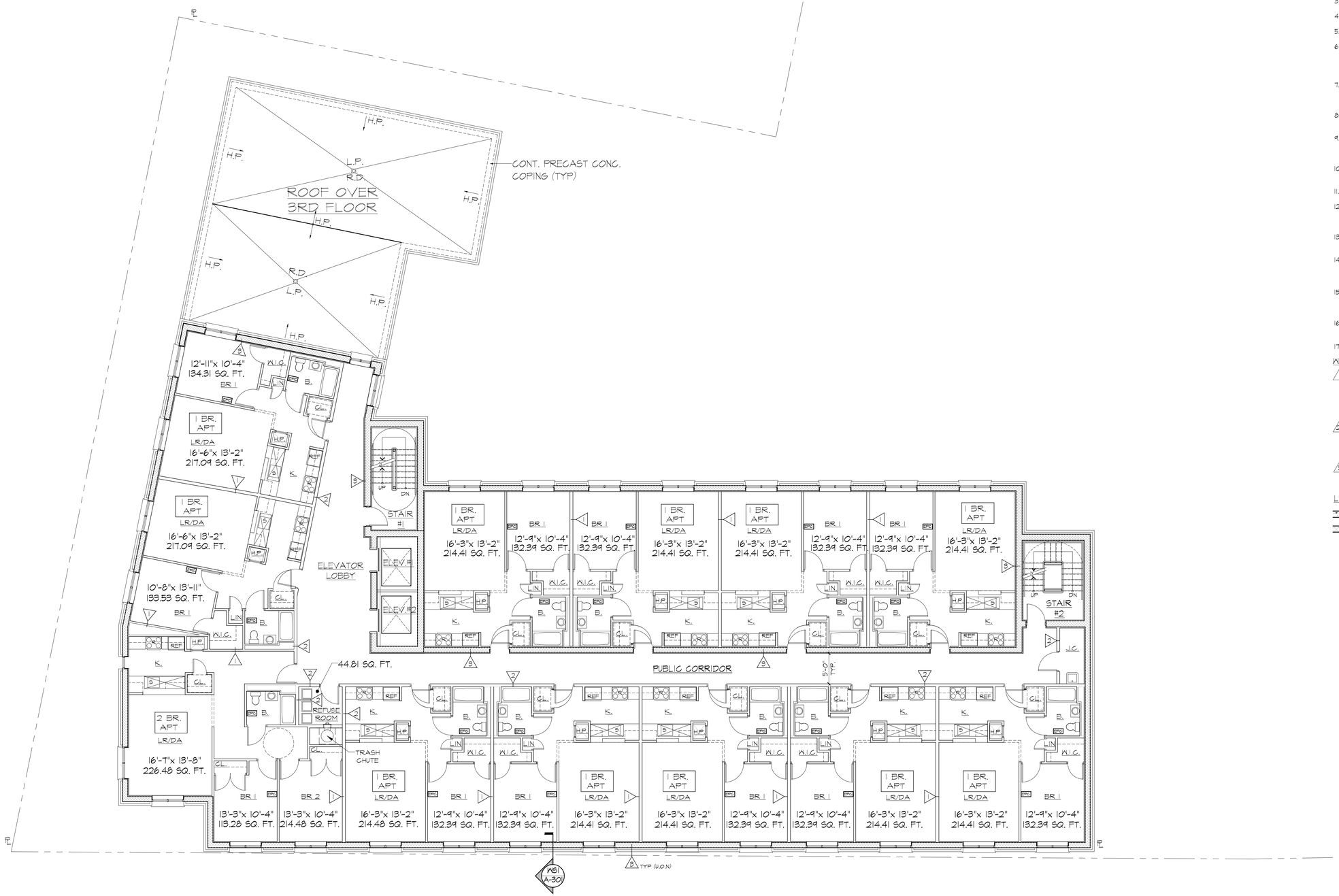
PROPOSED NEW DEVELOPMENT FOR:
RICHMOND HILL SENIOR LIVING RESIDENCE
129-09 JAMAICA AVENUE, QUEENS, NEW YORK

2ND & 3RD FLOOR PLAN

DATE:	01-25-10
PROJECT NO:	0924
DRAWN BY:	AR
CHECKED BY:	
DRAWING NO:	A-103.00
SCALE: AS NOTED	SHEET NO: 5 OF 13
NYC DOB NUMBER:	

0434-A-103



4TH & 5TH FLOOR PLAN

SCALE : 1/8" = 1'-0"

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10. WATER HEATERS: MINIMIZING CO: SPECIFY DIRECT VENTED OR COMBUSTION SEALED WATER HEATERS IF THE HEATER IS LOCATED IN A CONDITIONED SPACE.
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12. MATERIALS IN WET AREAS: USE MATERIALS WITH SMOOTH, DURABLE, CLEANABLE SURFACES. DO NOT USE MOLD - PROPAGATING MATERIALS SUCH AS VINYL WALLPAPER AND UNSEALED GROUT.
13. CLOTHES DRYER EXHAUST: CLOTHES DRYERS MUST BE EXHAUSTED DIRECTLY TO THE OUTDOORS.
14. INTEGRATED PEST MANAGEMENT: SEAL ALL WALL, FLOOR AND JOINT PENETRATIONS TO PREVENT PEST ENTRY. PROVIDE RODENT AND CORROSION PROOF SCREENS (E.G., COPPER OR STAINLESS STEEL MESH) FOR LARGE OPENINGS.
15. REDUCED HEAT - ISLAND EFFECT: ROOFING AND PAVING: 1) USE ENERGY-STAR COMPLIANT AND HIGH - EMISSIVE ROOFING FOR THE ENTIRE ROOF 2) USE LIGHT - COLORED/HIGH - ALBEDO MATERIALS FOR HARDSCAPED AREAS.
16. PROVIDE SOUND ATTENUATION BATT INSULATION IN ALL WALLS BETWEEN LIVING ROOMS AND BEDROOMS AND IN ALL TENANT SEPARATION PARTITIONS THROUGHTOUT (TYP.)
17. ALL APARTMENT UNITS ARE HANDICAP ADAPTABLE UNLESS OTHERWISE NOTED

WALL TYPE LEGEND:

1 HOUR RATED TENANT SEPARATION PARTITION - (1) LAYER OF 5/8" TYPE "X" GYPSUM BOARD ON (1) SIDE, (2) LAYERS OF 5/8" TYPE "X" GYPSUM BOARD ON OTHER SIDE OF 3-5/8" METAL STUDS @ 16" O.C. WITH 3-1/2" SOUND ATTENUATION INSULATION. EXTEND STUDS & GYPSUM BOARD UP TO UNDERSIDE OF CONCRETE DECK & SEAL TIGHT TO UNDERSIDE OF CONCRETE DECK AND/OR ROOF DECK W/ FIRESTOP SEALANT, WHICH EVER IS APPLICABLE. (GA FILE #WP-1052) (STC 50-54)

2 HOUR RATED PARTITION - (2) LAYERS 5/8" TYPE "X" GYPSUM BOARD ON EACH SIDE OF 3-5/8" 20 GAUGE METAL STUDS @ 16" O.C. WITH 3-1/2" SOUND ATTENUATION INSULATION. EXTEND GYPSUM BOARD & STUDS UP TO UNDERSIDE OF FLOOR DECK OR ROOF DECK. SEAL TIGHT TO DECK WITH FIRESTOP SEALANT. (GA FILE #WP-1522 STC 55-59).

3 2 HOUR RATED CONCRETE BLOCK WALL WITH GALVANIZED HORIZONTAL TRUSS TYPE REINFORCING AT ALTERNATE COURSES, SEAL TOP OF CONCRETE BLOCK WALL TIGHT TO UNDERSIDE OF CONCRETE PLANK OR DECK ABOVE WITH FIRESTOP SEALANT AND/OR FIRESAFING INSULATION AS REQUIRED (UL #906)

LEGEND:

- CONCRETE FOUNDATION WALL
- CONCRETE BLOCK WALL
- H.V.I. — UNIT DESIGNATED & OUTFITTED AS FULLY ACCESSIBLE FOR PERSONS WITH HEARING OR VISION IMPAIRMENT. (3 UNITS)
- UNIT DESIGNATED & OUTFITTED AS FULLY ACCESSIBLE & ADAPTED, MOVE IN READY, FOR PERSONS WITH A MOBILITY IMPAIRMENT. (7 UNITS)
- H.P. — HEAT PUMPS (ENERGY-STAR RATED)
- E.P.C. — EMERGENCY PULL CHORD

DATE	REVISIONS
02-05-10	ISSUED TO DHCR FOR REVIEW

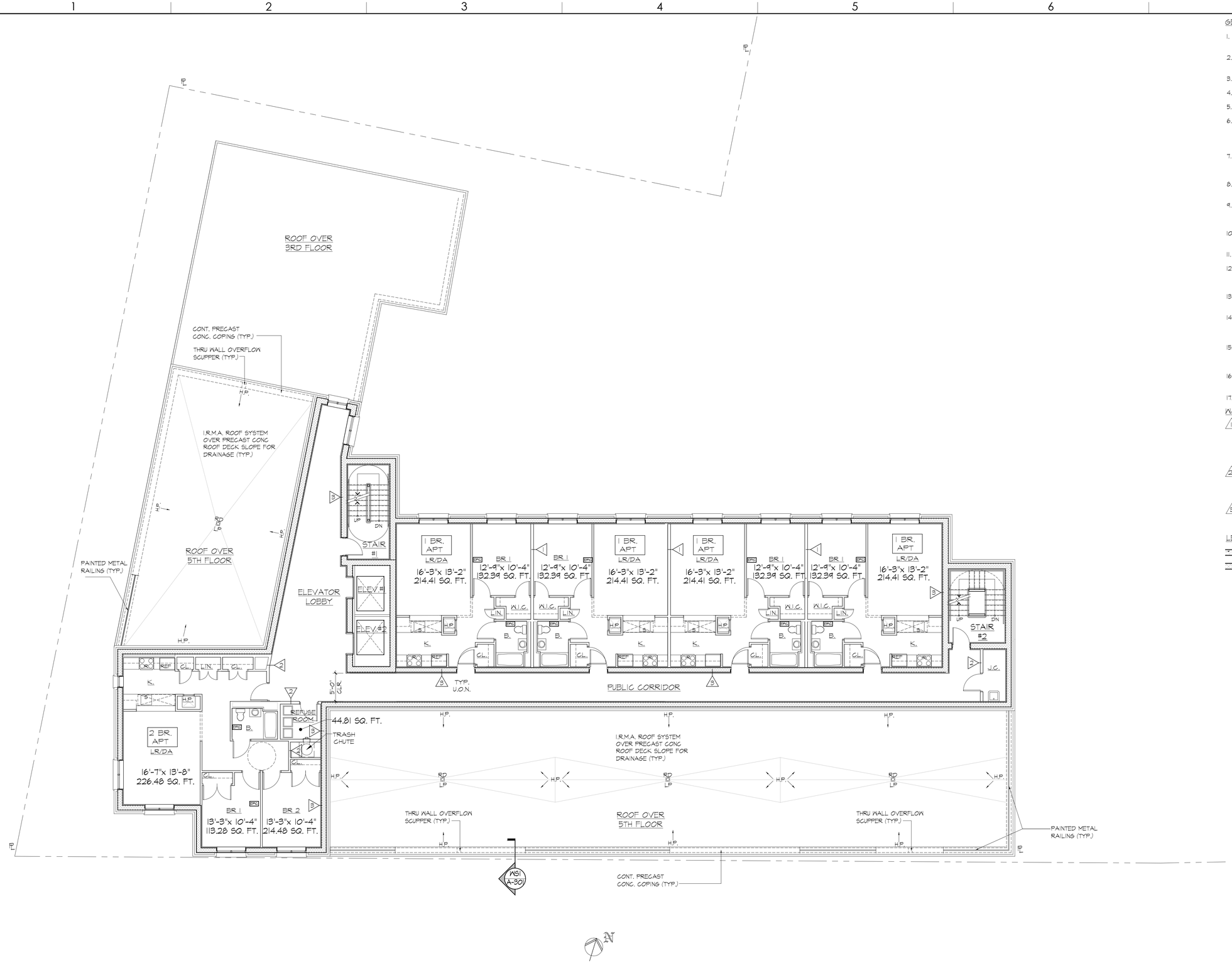
HUGO S. SUBOTOVSKY AIA
architects LLC
49 N. AIRMONT ROAD, SUFFERN, NY 10901 TEL: 845-368-0004 FAX: 845-368-0005
121 WEST 27TH STREET, NEW YORK,NY 10001 TEL: 212-242-5321 FAX: 800-772-8304

PROPOSED NEW DEVELOPMENT FOR:
RICHMOND HILL SENIOR LIVING RESIDENCE
129-09 JAMAICA AVENUE, QUEENS, NEW YORK

4TH & 5TH FLOOR PLAN

DATE:	01-25-10
PROJECT NO:	0924
DRAWN BY:	AR
CHECKED BY:	
DRAWING NO:	A-104.00
SCALE: AS NOTED	SHEET NO: 6 OF 13
NYC DOB NUMBER:	

0434-A-104



GENERAL NOTES

1. USE ENERGY STAR APPLIANCES, LIGHT FIXTURES AND HEATING SYSTEMS OR THE EQUIVALENT WHICH WILL PRODUCE THE SAME OR COMPARABLE ENERGY EFFICIENCY OR SAVINGS.
2. SELECT NATIVE OR NON INVASIVE NEW TREES AND PLANTS THAT ARE APPROPRIATE TO THE SITE'S SOIL AND MICROCLIMATE.
3. INSTALL WATER CONSERVING FIXTURES THROUGHOUT.
4. USE DAYLIGHT SENSORS OR TIMERS ON OUTDOOR LIGHTING TO MAXIMIZE ENERGY EFFICIENCY.
5. ALL INTERIOR PAINTS, PRIMERS, ADHESIVES AND SEALANTS MUST CONTAIN LOW OR NO VOCS.
6. GREEN LABEL CERTIFIED FLOOR COVERING: DO NOT INSTALL CARPETS IN BELOW GRADE LIVING SPACES, ENTRYWAYS, LAUNDRY ROOMS, BATHROOMS, KITCHENS OR UTILITY ROOMS. IF USING CARPET, USE PRODUCTS THAT MEET THE CARPET AND RUG INSTITUTE'S GREEN LABEL CERTIFIED CARPET, PAD AND CARPET ADHESIVES.
7. EXHAUST FANS - BATHROOM : INSTALL ENERGY STAR-LABELED BATHROOM FANS THAT EXHAUST TO THE OUTDOORS AND ARE EQUIPPED WITH A HUMIDISTAT SENSOR OR TIMER, OR OPERATE CONTINUOUSLY.
8. VENTILATION : INSTALL A VENTILATION SYSTEM FOR THE DWELLING UNIT THAT PROVIDES 15 CUBIC FEET PER MINUTE OF FRESH AIR, PER OCCUPANT.
9. WATER HEATERS : PREVENTION : INSTALL CONVENTIONAL HOT WATER HEATERS IN ROOMS WITH DRAINS OR CATCH PANS PIPED TO THE EXTERIOR OF THE DWELLING AND WITH NON-WATER SENSITIVE FLOOR COVERINGS.
10. WATER HEATERS: MINIMIZING CO: SPECIFY DIRECT VENTED OR COMBUSTION SEALED WATER HEATERS IF THE HEATER IS LOCATED IN A CONDITIONED SPACE.
11. COLD WATER PIPE INSULATION: INSULATE EXPOSED COLD WATER PIPES.
12. MATERIALS IN WET AREAS: USE MATERIALS WITH SMOOTH, DURABLE, CLEANABLE SURFACES. DO NOT USE MOLD - PROPAGATING MATERIALS SUCH AS VINYL WALLPAPER AND UNSEALED GROUT.
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16. PROVIDE SOUND ATTENUATION BATT INSULATION IN ALL WALLS BETWEEN LIVING ROOMS AND BEDROOMS AND IN ALL TENANT SEPARATION PARTITIONS THROUGHTOUT (TYP.)
17. ALL APARTMENT UNITS ARE HANDICAP ADAPTABLE UNLESS OTHERWISE NOTED

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2 HOUR RATED PARTITION - (2) LAYERS 5/8" TYPE "X" GYPSUM BOARD ON EACH SIDE OF 3-5/8" 20 GAUGE METAL STUDS @ 16" O.C. WITH 3-1/2" SOUND ATTENUATION INSULATION. EXTEND GYPSUM BOARD & STUDS UP TO UNDERSIDE OF FLOOR DECK OR ROOF DECK. SEAL TIGHT TO DECK WITH FIRESTOP SEALANT. (GA FILE #WP-1522 STC 55-59).

2 HOUR RATED CONCRETE BLOCK WALL WITH GALVANIZED HORIZONTAL TRUSS TYPE REINFORCING AT ALTERNATE COURSES. SEAL TOP OF CONCRETE BLOCK WALL TIGHT TO UNDERSIDE OF CONCRETE PLANK OR DECK ABOVE WITH FIRESTOP SEALANT AND/OR FIRESAFING INSULATION AS REQUIRED (UL #906)

LEGEND:

CONCRETE FOUNDATION WALL

CONCRETE BLOCK WALL

H.V.I. — UNIT DESIGNATED & OUTFITTED AS FULLY ACCESSIBLE FOR PERSONS WITH HEARING OR VISION IMPAIRMENT. (3 UNITS)

UNIT DESIGNATED & OUTFITTED AS FULLY ACCESSIBLE & ADAPTED, MOVE IN READY, FOR PERSONS WITH A MOBILITY IMPAIRMENT. (1 UNITS)

H.P. — HEAT PUMPS (ENERGY-STAR RATED)

E.P.C. — EMERGENCY PULL CHORD

DATE	REVISIONS
02-05-10	ISSUED TO DHCR FOR REVIEW

HUGO S. SUBOTOVSKY AIA
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49 N. AIRMONT ROAD, SUFFERN, NY 10901 TEL: 845-368-0004 FAX: 845-368-0005
121 WEST 27TH STREET, NEW YORK,NY 10001 TEL: 212-242-5321 FAX: 800-772-8304

PROPOSED NEW DEVELOPMENT FOR:

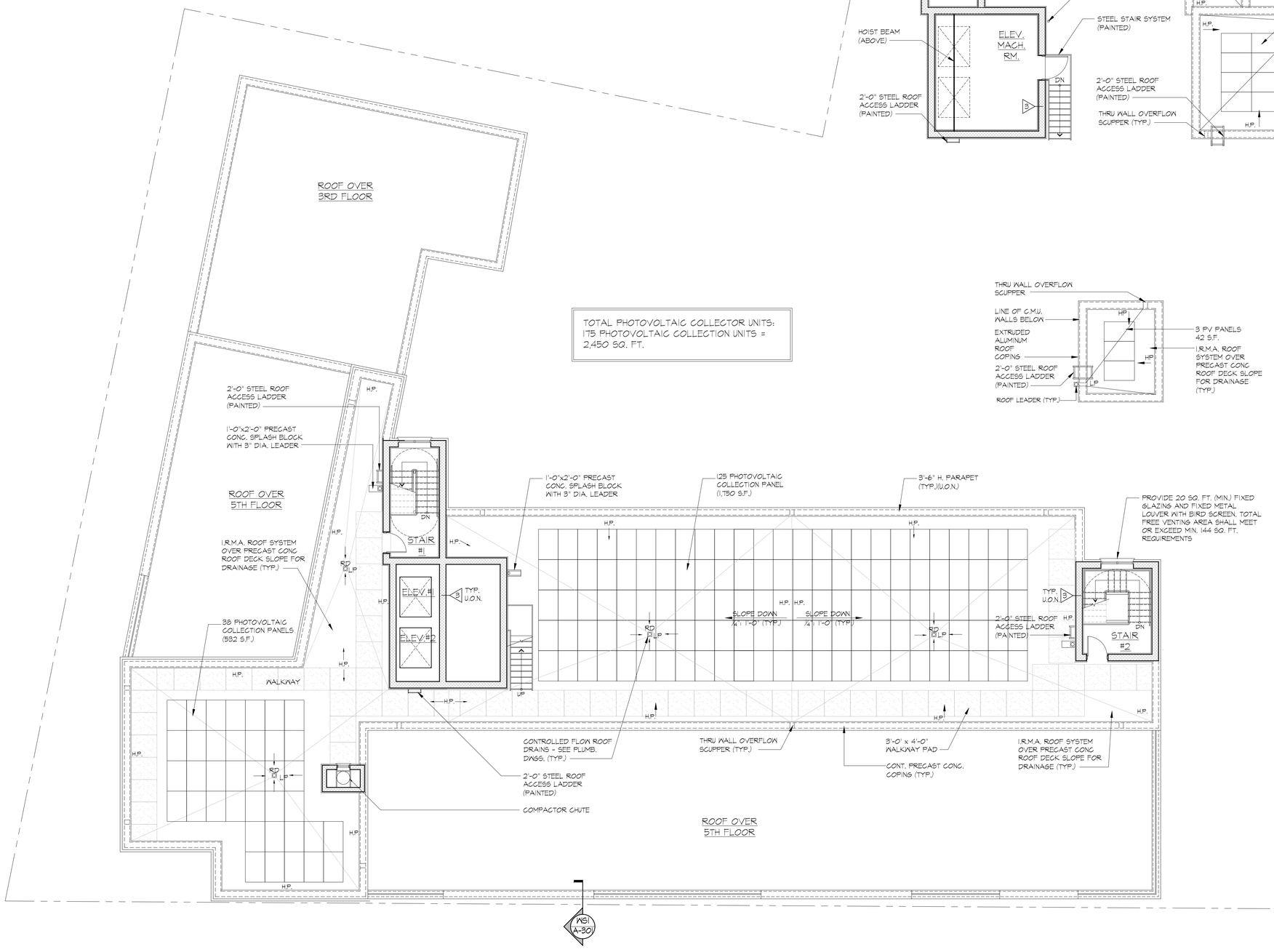
RICHMOND HILL SENIOR LIVING RESIDENCE

129-09 JAMAICA AVENUE, QUEENS, NEW YORK

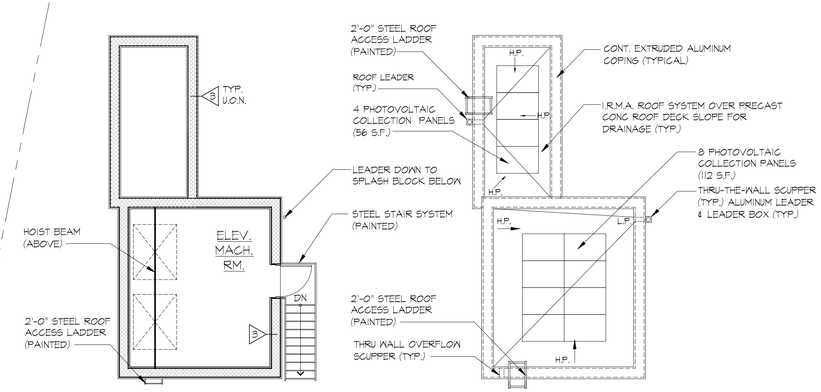
6TH FLOOR PLAN

DATE:	01-25-10
PROJECT NO:	0924
DRAWN BY:	AR
CHECKED BY:	
DRAWING NO:	A-105.00
SCALE: AS NOTED	SHEET NO: 7 OF 13
NYC DOB NUMBER:	

0434-A-105



TOTAL PHOTOVOLTAIC COLLECTOR UNITS:
175 PHOTOVOLTAIC COLLECTION UNITS =
2,450 SQ. FT.



GENERAL NOTES

1. USE ENERGY STAR APPLIANCES, LIGHT FIXTURES AND HEATING SYSTEMS OR THE EQUIVALENT WHICH WILL PRODUCE THE SAME OR COMPARABLE ENERGY EFFICIENCY OR SAVINGS.
2. SELECT NATIVE OR NON INVASIVE NEW TREES AND PLANTS THAT ARE APPROPRIATE TO THE SITE'S SOIL AND MICROCLIMATE.
3. INSTALL WATER CONSERVING FIXTURES THROUGHOUT.
4. USE DAYLIGHT SENSORS OR TIMERS ON OUTDOOR LIGHTING TO MAXIMIZE ENERGY EFFICIENCY.
5. ALL INTERIOR PAINTS, PRIMERS, ADHESIVES AND SEALANTS MUST CONTAIN LOW OR NO VOCS.
6. GREEN LABEL CERTIFIED FLOOR COVERING: DO NOT INSTALL CARPETS IN BELOW GRADE LIVING SPACES, ENTRYWAYS, LAUNDRY ROOMS, BATHROOMS, KITCHENS OR UTILITY ROOMS. IF USING CARPET, USE PRODUCTS THAT MEET THE CARPET AND RUG INSTITUTE'S GREEN LABEL CERTIFIED CARPET, PAD AND CARPET ADHESIVES.
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9. WATER HEATERS ; PREVENTION ; INSTALL CONVENTIONAL HOT WATER HEATERS IN ROOMS WITH DRAINS OR CATCH PANS PIPED TO THE EXTERIOR OF THE DWELLING AND WITH NON-WATER SENSITIVE FLOOR COVERINGS.
10. WATER HEATERS: MINIMIZING CO. SPECIFY DIRECT VENTED OR COMBUSTION SEALED WATER HEATERS IF THE HEATER IS LOCATED IN A CONDITIONED SPACE.
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15. REDUCED HEAT - ISLAND EFFECT: ROOFING AND PAVING. 1) USE ENERGY-STAR COMPLIANT AND HIGH - EMISSIVE ROOFING FOR THE ENTIRE ROOF 2) USE LIGHT - COLORED/HIGH - ALBEDO MATERIALS FOR HARDSCAPED AREAS.
16. PROVIDE SOUND ATTENUATION BATT INSULATION IN ALL WALLS BETWEEN LIVING ROOMS AND BEDROOMS AND IN ALL TENANT SEPARATION PARTITIONS THROUGHTOUT (TYP.)
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WALL TYPE LEGEND:

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LEGEND:

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CONCRETE BLOCK WALL

H.V.I. — UNIT DESIGNATED & OUTFITTED AS FULLY ACCESSIBLE FOR PERSONS WITH HEARING OR VISION IMPAIRMENT. (3 UNITS)

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H.P. — HEAT PUMPS (ENERGY-STAR RATED)

E.P.C. — EMERGENCY PULL CHORD

DATE	REVISIONS
02-05-10	ISSUED TO DHCR FOR REVIEW

HUGO S. SUBOTOVSKY AIA
architects LLC
49 N. AIRMONT ROAD, SUFFERN, NY 10901 TEL: 845-368-0004 FAX: 845-368-0005
121 WEST 27TH STREET, NEW YORK,NY 10001 TEL: 212-242-5321 FAX: 800-772-8304

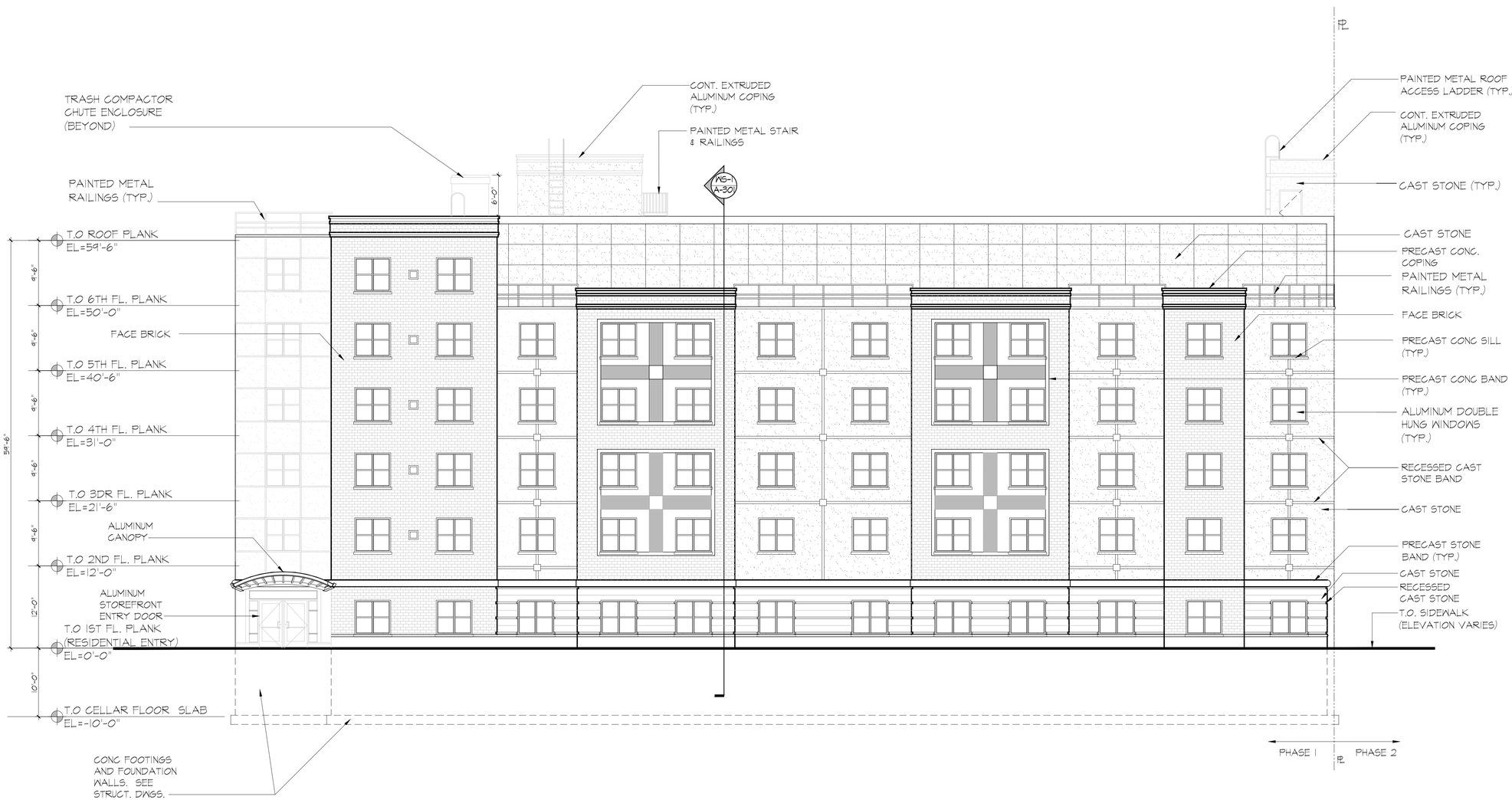
PROPOSED NEW DEVELOPMENT FOR:
RICHMOND HILLS SENIOR LIVING RESIDENCE
129-09 JAMAICA AVENUE, QUEENS, NEW YORK

ROOF PLAN, BULKHEAD FLOOR AND ROOF PLANS

DATE:	01-25-10
PROJECT NO:	0924
DRAWN BY:	AR
CHECKED BY:	
DRAWING NO:	A-106.00
SCALE: AS NOTED	SHEET NO: 8 OF 13

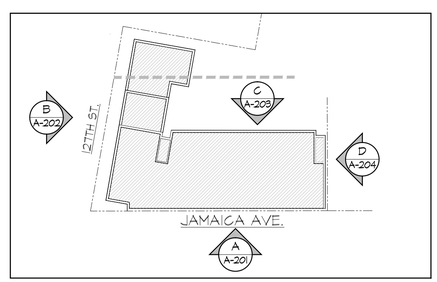
NYC DOB NUMBER:

0434-A-106



ELEVATION A

SCALE : 1/8" = 1'-0"



KEY PLAN

NOT TO SCALE

GENERAL NOTES

1. USE ENERGY STAR APPLIANCES, LIGHT FIXTURES AND HEATING SYSTEMS OR THE EQUIVALENT WHICH WILL PRODUCE THE SAME OR COMPARABLE ENERGY EFFICIENCY OR SAVINGS.
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17. ALL APARTMENT UNITS ARE HANDICAP ADAPTABLE UNLESS OTHERWISE NOTED

DATE	REVISIONS
02-05-10	ISSUED TO DHCR FOR REVIEW

HUGO S. SUBOTOVSKY AIA architects LLC
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121 WEST 27TH STREET, NEW YORK,NY 10001 TEL: 212-242-5321 FAX: 800-772-8304

PROPOSED NEW MIXED-USE STRUCTURE FOR:

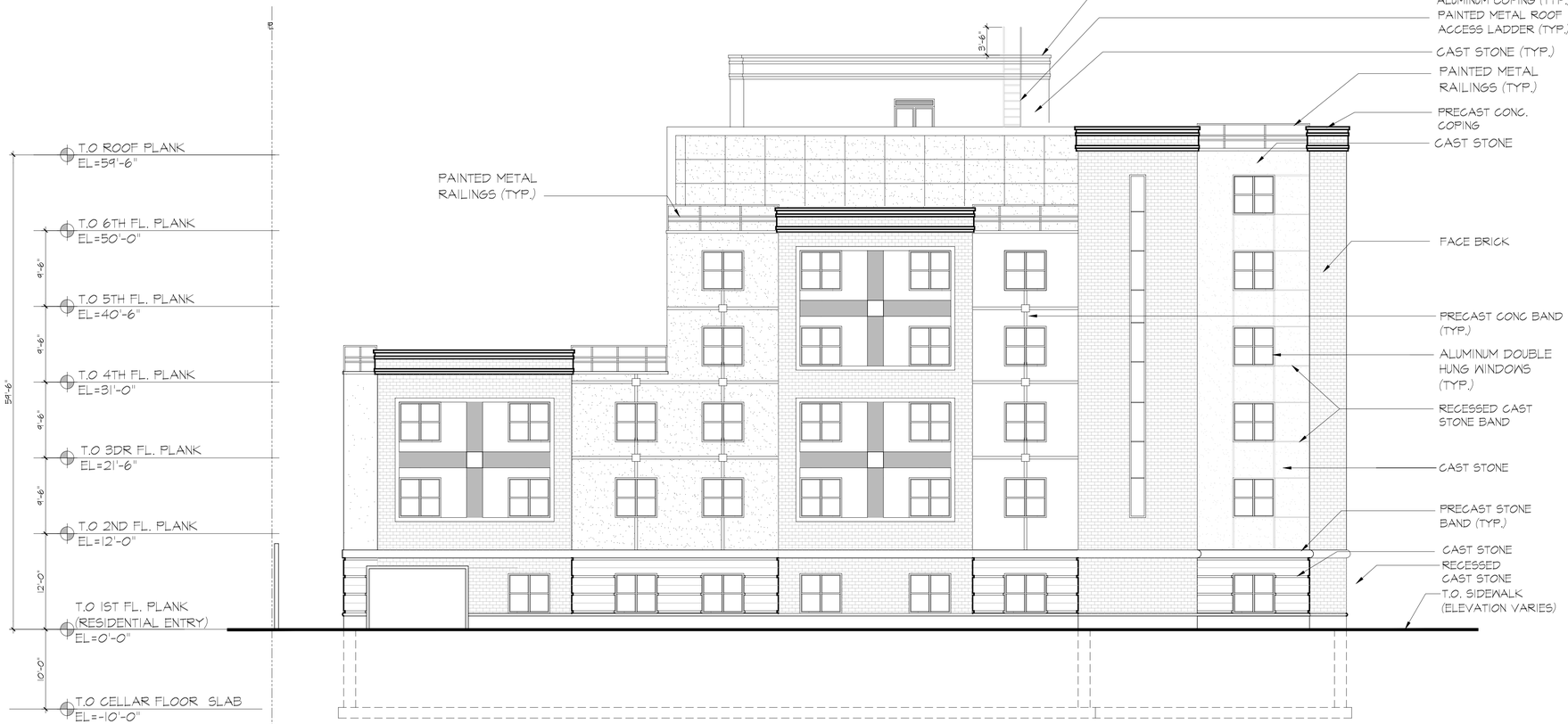
RICHMOND HILL SENIOR LIVING RESIDENCE

129-09 JAMAICA AVENUE, QUEENS, NEW YORK

EXTERIOR ELEVATIONS

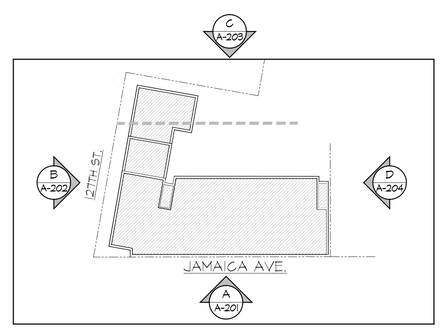
DATE:	05-01-09
PROJECT NO:	0434
DRAWN BY:	MA
CHECKED BY:	EV
DRAWING NO:	A-201.00
SCALE:	AS NOTED SHEET NO: 9 OF 13
NYC DOB NUMBER:	

0434-A-201



ELEVATION B

SCALE : 1/8" = 1'-0"



KEY PLAN

NOT TO SCALE

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DATE	REVISIONS
02-05-10	ISSUED TO DHCR FOR REVIEW

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PROPOSED NEW MIXED-USE STRUCTURE FOR:

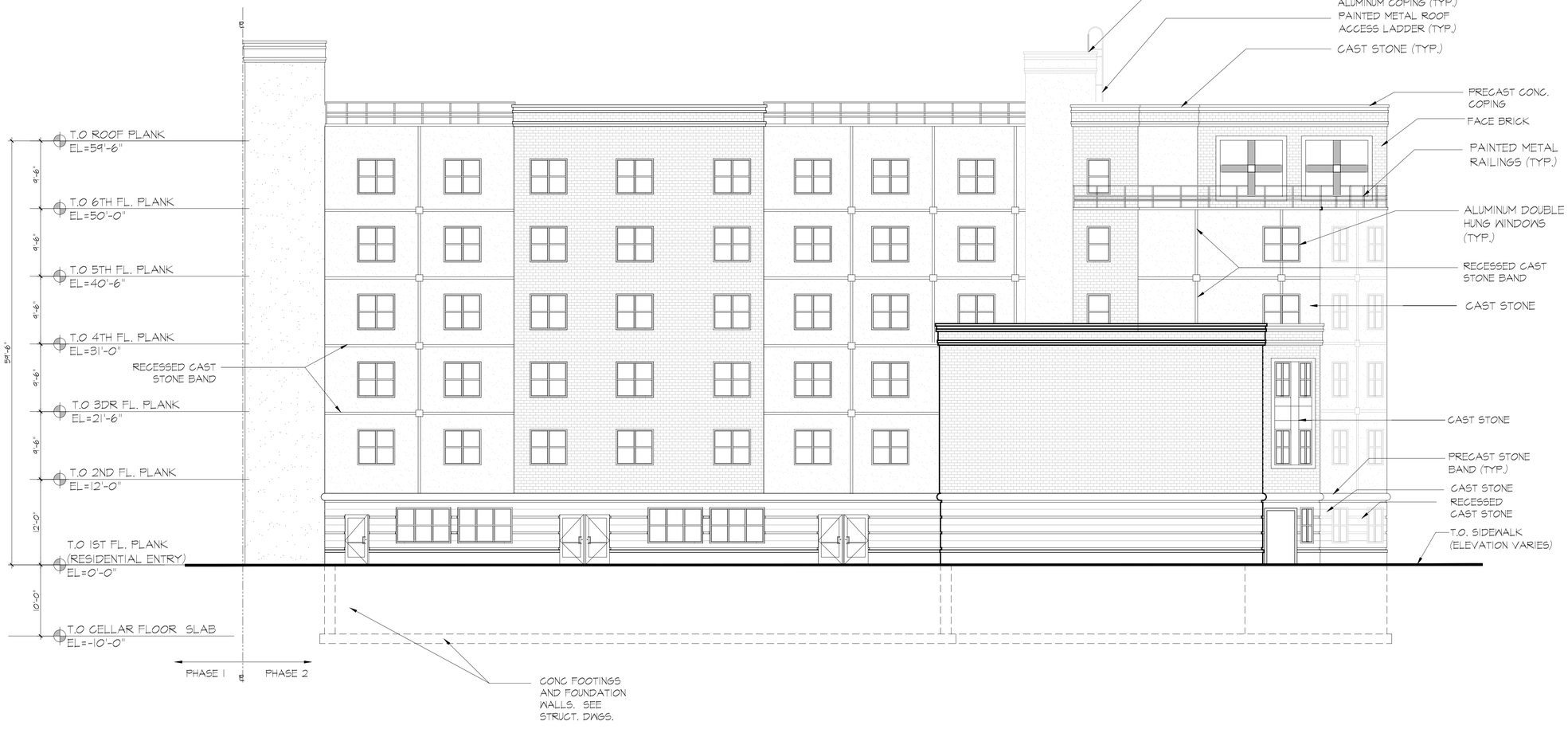
RICHMOND HILL SENIOR LIVING RESIDENCE

129-01 JAMAICA AVENUE AND 127 STREET, QUEENS, NEW YORK

EXTERIOR ELEVATIONS

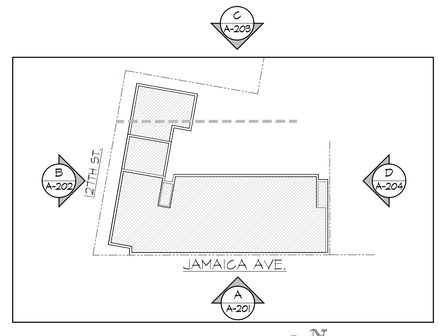
DATE:	05-01-09
PROJECT NO:	0434
DRAWN BY:	MA
CHECKED BY:	EV
DRAWING NO:	A-202.00
SCALE:	AS NOTED SHEET NO: 10 OF 13
NYC DOB NUMBER:	

0434-A-201



ELEVATION C

SCALE : 1/8" = 1'-0"



KEY PLAN

NOT TO SCALE

GENERAL NOTES

1. USE ENERGY STAR APPLIANCES, LIGHT FIXTURES AND HEATING SYSTEMS OR THE EQUIVALENT WHICH WILL PRODUCE THE SAME OR COMPARABLE ENERGY EFFICIENCY OR SAVINGS.
2. SELECT NATIVE OR NON INVASIVE NEW TREES AND PLANTS THAT ARE APPROPRIATE TO THE SITE'S SOIL AND MICROCLIMATE.
3. INSTALL WATER CONSERVING FIXTURES THROUGHOUT.
4. USE DAYLIGHT SENSORS OR TIMERS ON OUTDOOR LIGHTING TO MAXIMIZE ENERGY EFFICIENCY.
5. ALL INTERIOR PAINTS, PRIMERS, ADHESIVES AND SEALANTS MUST CONTAIN LOW OR NO VOCS.
6. GREEN LABEL CERTIFIED FLOOR COVERING: DO NOT INSTALL CARPETS IN BELOW GRADE LIVING SPACES, ENTRYWAYS, LAUNDRY ROOMS, BATHROOMS, KITCHENS OR UTILITY ROOMS. IF USING CARPET, USE PRODUCTS THAT MEET THE CARPET AND RUG INSTITUTE'S GREEN LABEL CERTIFIED CARPET, PAD AND CARPET ADHESIVES.
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12. MATERIALS IN WET AREAS: USE MATERIALS WITH SMOOTH, DURABLE, CLEANABLE SURFACES. DO NOT USE MOLD - PROPAGATING MATERIALS SUCH AS VINYL WALLPAPER AND UNSEALED GROUT.
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16. PROVIDE SOUND ATTENUATION BATT INSULATION IN ALL WALLS BETWEEN LIVING ROOMS AND BEDROOMS AND IN ALL TENANT SEPARATION PARTITIONS THROUGHTOUT (TYP.)
17. ALL APARTMENT UNITS ARE HANDICAP ADAPTABLE UNLESS OTHERWISE NOTED

02-05-10	ISSUED TO DHCR FOR REVIEW
DATE	REVISIONS

HUGO S. SUBOTOVSKY AIA
architects LLC
49 N. AIRMONT ROAD, SUFFERN, NY 10901 TEL: 845-368-0004 FAX: 845-368-0005
121 WEST 27TH STREET, NEW YORK,NY 10001 TEL: 212-242-5321 FAX: 800-772-8304

PROPOSED NEW MIXED-USE STRUCTURE FOR:

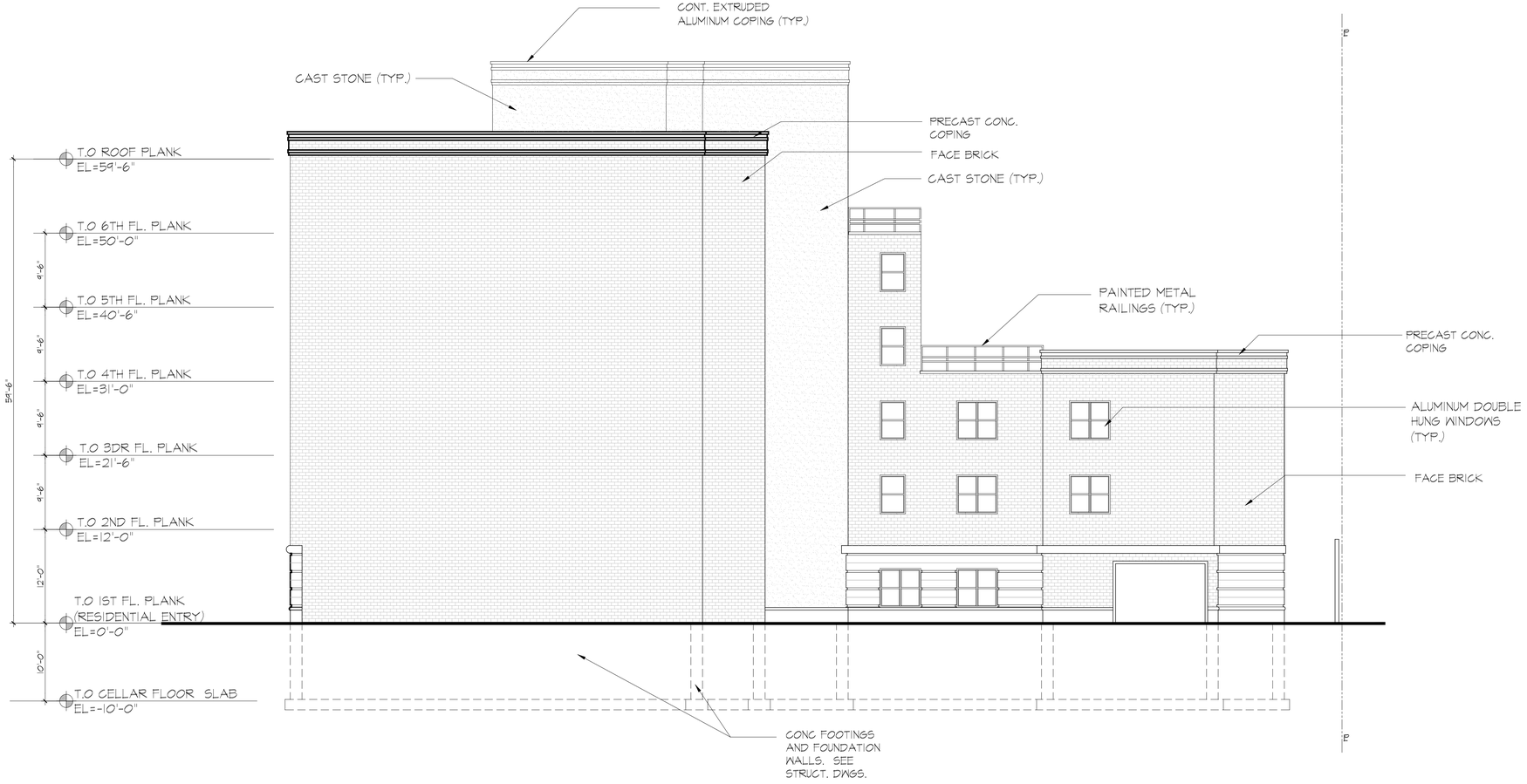
RICHMOND HILL SENIOR LIVING RESIDENCE

129-09 JAMAICA AVENUE , QUEENS, NEW YORK

EXTERIOR ELEVATIONS

DATE:	05-01-09
PROJECT NO:	0434
DRAWN BY:	MA
CHECKED BY:	EV
DRAWING NO:	A-203.00
SCALE: AS NOTED	SHEET NO: 11 OF 13
NYC DOB NUMBER:	

0434-A-201



ELEVATION D

SCALE : 1/8" = 1'-0"

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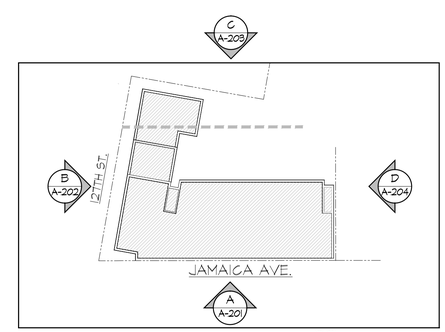


KEY PLAN
NOT TO SCALE

DATE	REVISIONS
02-05-10	ISSUED TO DHCR FOR REVIEW

HUGO S. SUBOTOVSKY AIA
architects LLC
49 N. AIRMONT ROAD, SUFFERN, NY 10901 TEL: 845-368-0004 FAX: 845-368-0005
121 WEST 27TH STREET, NEW YORK,NY 10001 TEL: 212-242-5321 FAX: 800-772-8304

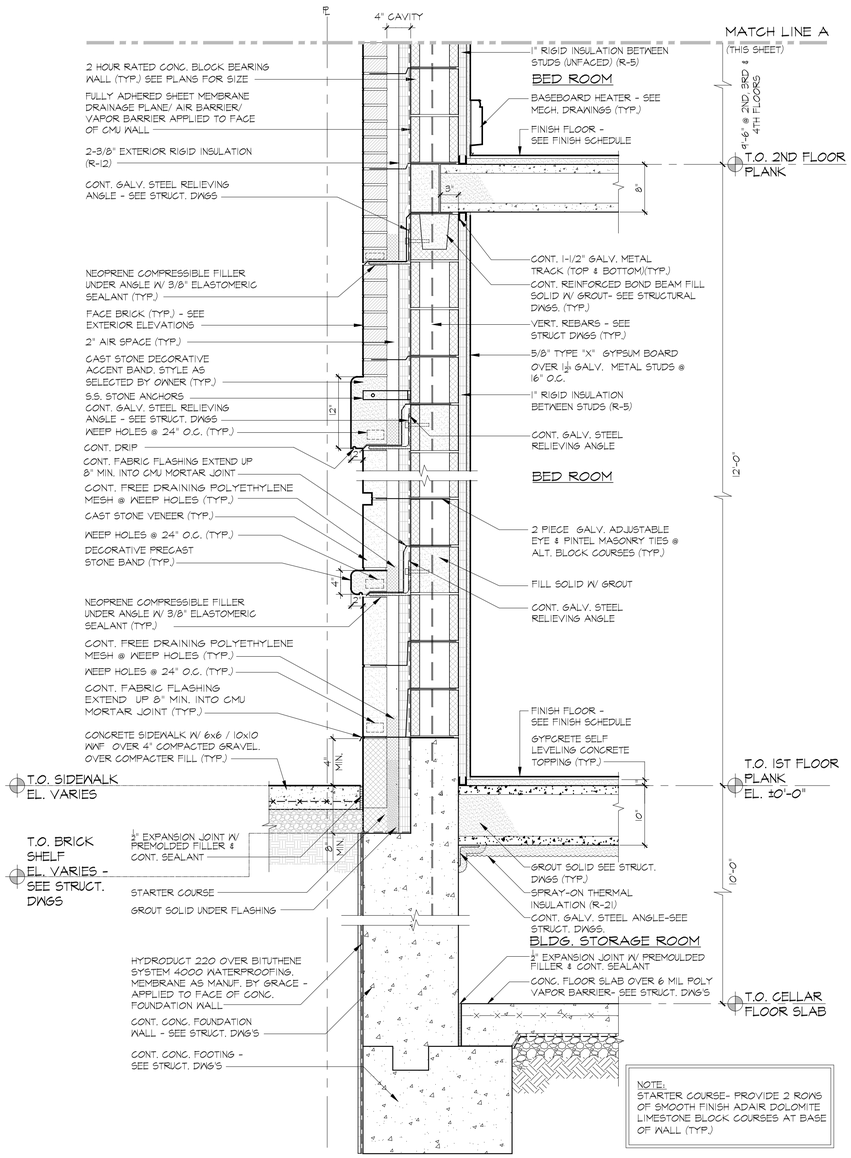
PROPOSED NEW MIXED-USE STRUCTURE FOR:
RICHMOND HILL SENIOR LIVING RESIDENCE
129-09 JAMAICA AVENUE , QUEENS, NEW YORK

EXTERIOR ELEVATIONS

DATE:	05-01-09
PROJECT NO:	0434
DRAWN BY:	MA
CHECKED BY:	EV
DRAWING NO:	A-204.00
SCALE: AS NOTED	SHEET NO: 12 OF 13

NYC DOB NUMBER:

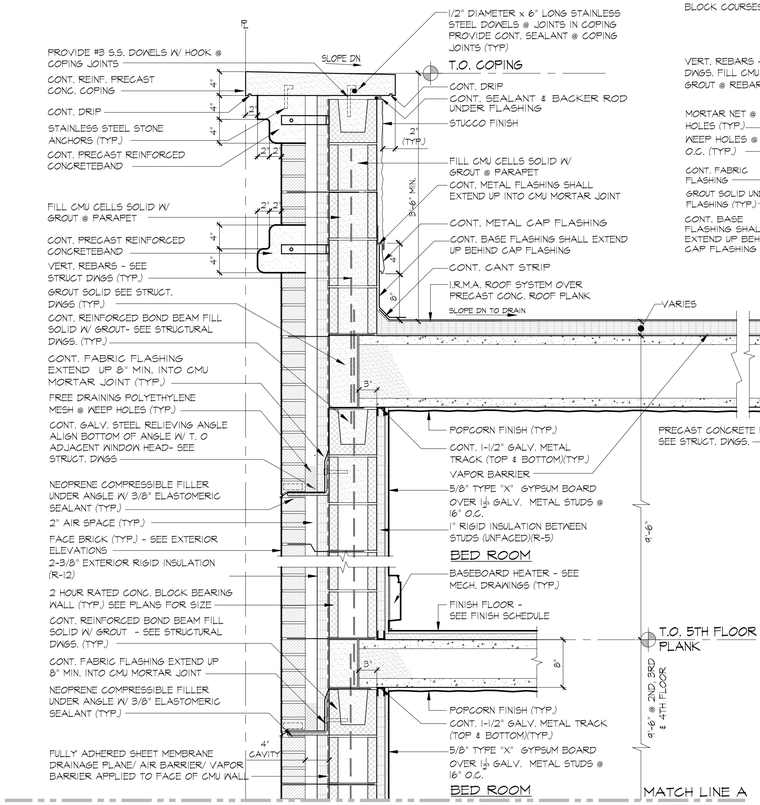
0434-A-201



WS-1 TYPICAL WALL SECTION

SCALE : 1" = 1'-0"

A-101 THRU A-106 & A-201



GENERAL NOTES:

1. G.C. SHALL PROVIDE N.Y. CITY APPROVED CAST STONE & MASONRY VENEER TIES. SUBMIT SHOP DWGS. TO STRUCTURAL ENGINEERS FOR APPROVAL PRIOR TO INSTALLATION (TYP.)
2. WATERPROOFING SYSTEM SHALL BE FURNISHED & INSTALLED PER GEO-TECH ENGINEERS RECOMMENDATIONS.
3. ALL MASONRY TIES SHALL BE HOT DIPPED GALVANIZED (TYP.)
4. FLASHING SHALL EXTEND PAST FACE OF MASONRY 1/4" MIN.

DATE	REVISIONS
02-05-10	ISSUED TO DHCR FOR REVIEW

HUGO S. SUBOTOVSKY, A.I.A.
architects LLC
49 N. AIRMONT ROAD, SUFFERN, NY 10901 TEL: 845-368-0004 FAX: 845-368-0005
121 WEST 27TH STREET, NEW YORK, NY 10001 TEL: 212-242-5321 FAX: 800-772-8304

PROPOSED NEW DEVELOPMENT FOR:

RICHMOND HILL SENIOR LIVING RESIDENCE

129-09 JAMAICA AVENUE, QUEENS, NEW YORK

TYPICAL WALL SECTION

DATE:	01-25-10
PROJECT NO:	0924
DRAWN BY:	AR
CHECKED BY:	
DRAWING NO:	A-301.00
SCALE: AS NOTED	SHEET NO: 13 OF 13
NYC DOB NUMBER:	

0434-A-301

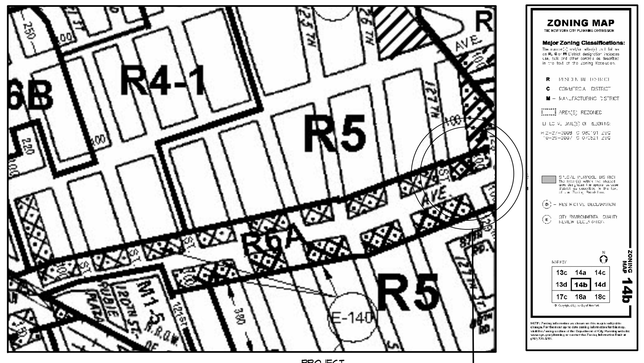
PROPOSED NEW DEVELOPMENT FOR:

JAMAICA AVENUE

QUEENS, NEW YORK

VIEW AT JAMAICA AVENUE

NOT TO SCALE



ZONING MAP

NOT TO SCALE

AERIAL MAP

NOT TO SCALE

DRAWING SCHEDULE

APARTMENT DISTRIBUTION					
TYPE	0 BR. APTS.	1 BR. APTS.	2 BR. APTS.	3 BR. APTS.	TOTAL
FIRST FLOOR	1	6	11	1	19
SECOND FLOOR	2	5	14	1	22
THIRD FLOOR	2	6	14	1	23
FOURTH FLOOR	2	6	14	1	23
FIFTH FLOOR	2	2	6	1	11
SIXTH FLOOR	2	2	6	1	11
SEVENTH FLOOR	2	1	4	1	8
TOTAL	13	28	69	7	117

DEVELOPER:

THE ARKER COMPANIES

15 VERBENA AVE.
SUITE 100
FLORAL PARK, NY 11001
TEL: 516-277-9300
FAX: (516) 374-3326

ARCHITECT:

HUGO S. SUBOTOVSKY AIA architects LLC

49 N. AIRMONT ROAD, SUFFERN, NY 10901 TEL: 845-368-0004 FAX: 845-368-0005
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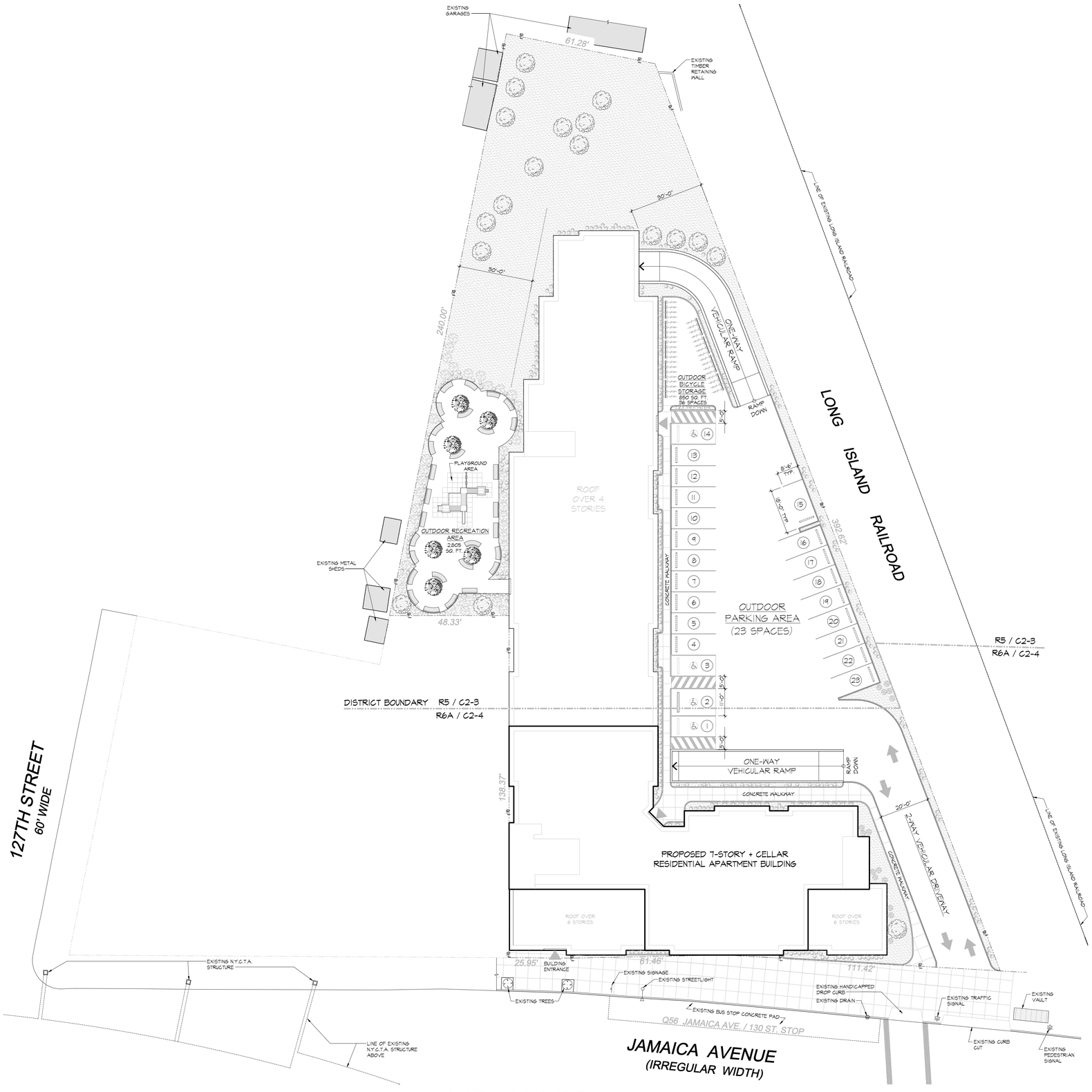
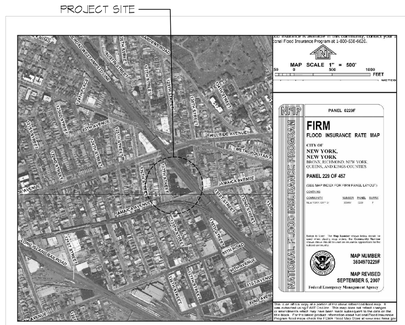
09-10-10 ISSUED TO HPD/DACE FOR REVIEW & COMMENT

A



SCHEMATIC SITE PLAN

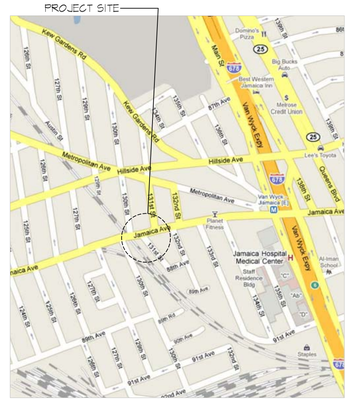
SCALE : 1" = 20'-0"



FLOOD MAP

NOT TO SCALE

NOTE:
STORM WATER TO BE CAPTURED AND STORED ON ROOF SURFACES AND PURGED INTO SEWER SYSTEM AT AN ACCEPTABLE RATE

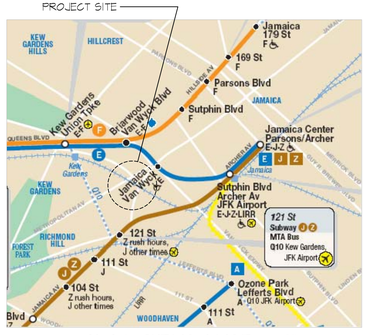


VICINITY MAP

NOT TO SCALE

N.Y.C. BUS MAP

NOT TO SCALE



N.Y.C. SUBWAY MAP

NOT TO SCALE

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DATE	REVISIONS
09-10-10	ISSUED TO HPD / DACE FOR REVIEW AND COMMENT

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PROPOSED NEW DEVELOPMENT FOR:

JAMAICA 2

129-09 JAMAICA AVENUE,QUEENS, NEW YORK

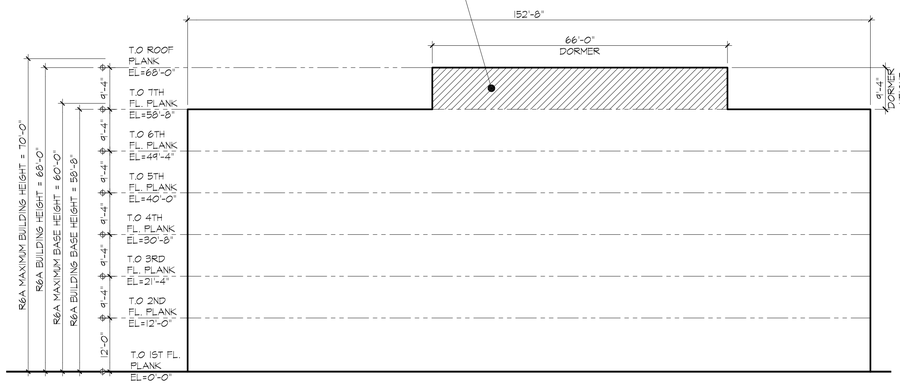
SCHEMATIC SITE PLAN & TRANSPORTATION MAPS

DATE:	XX/XX/XX
PROJECT NO:	0924
DRAWN BY:	AR
CHECKED BY:	
DRAWING NO:	A-001.00
SCALE: AS NOTED	SHEET NO: 2 OF 23
NYC DOB NUMBER:	

0924-A-001.00

DORMER CALCULATION CHART ZR. 23-621(c)

JAMAICA AVENUE
60% - 9'-4" = 50.67%
50.67% x 152'-8" = 77'-4" PERMITTED DORMER
66'-0" DORMER < 77'-4" MAX. PERMITTED

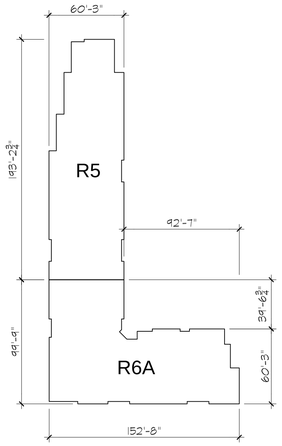


STREETSCAPE ALONG JAMAICA AVENUE

SCALE : 1/16" = 1'-0"

FRONT ELEVATION @ JAMAICA AVENUE

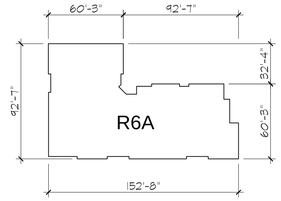
SCALE : 1/16" = 1'-0"



2ND FLOOR PLAN

NOT TO SCALE

R5 RESIDENTIAL GROSS FLOOR AREA = 10,262.00 Sq.Ft.
R6A RESIDENTIAL GROSS FLOOR AREA = 11,010.00 Sq.Ft.
R5 = 12 APARTMENTS
R6A = 10 APARTMENTS



TYP. 5TH & 6TH FLOOR PLAN

NOT TO SCALE

R6A RESIDENTIAL GROSS FLOOR AREA = 110,577.00 Sq.Ft. (EACH FLOOR)
R6A = 11 APARTMENTS (EACH FLOOR)

1ST FLOOR PLAN

NOT TO SCALE

R5 RESIDENTIAL GROSS FLOOR AREA = 10,262.00 Sq.Ft.
R6A RESIDENTIAL GROSS FLOOR AREA = 11,010.00 Sq.Ft.
R5 = 10 APARTMENTS
R6A = 9 APARTMENTS

TYP. 3RD & 4TH FLOOR PLAN

NOT TO SCALE

R5 RESIDENTIAL GROSS FLOOR AREA = 10,262.00 Sq.Ft. (EACH FLOOR)
R6A RESIDENTIAL GROSS FLOOR AREA = 11,010.00 Sq.Ft. (EACH FLOOR)
R5 = 12 APARTMENTS (EACH FLOOR)
R6A = 11 APARTMENTS (EACH FLOOR)

7TH FLOOR PLAN

NOT TO SCALE

R6A RESIDENTIAL GROSS FLOOR AREA = 8,343.30 Sq.Ft.
R6A = 8 APARTMENTS

SIDE ELEVATION

SCALE : 1/16" = 1'-0"

QUALITY HOUSING PROGRAM NOTES

	PERMITTED/REQUIRED		PROPOSED			REMARKS	
1 TREE PER 25'-0" OF FRONTAGE	8	TREES	8	TREES	OK	RES. 28-12	Two (2) on, six (6) off site as per DOT regulations
SIZE OF DWELLING UNITS	400.00	SQ. FT. MIN.	422.30	SQ. FT.	OK	RES. 28-21	
WINDOWS	DOUBLE GLAZED		1" INSULATED DOUBLE GLAZED PROVIDED		OK	RES. 28-22	
REFUSE STORAGE AND DISPOSAL	12.00	SQ. FT. MIN.	66.00	SQ. FT.	OK	RES. 28-23	
LAUNDRY FACILITIES	1 WASHER 1 DRYER	PER 20 D.U. PER 40 D.U.	6.00 3.00	WASHERS DRYERS	OK OK	RES. 28-24	(...) at least one washing machine per 20 dwelling units or rooming units and at least one dryer per 40 dwelling units.
DAYLIGHT IN CORRIDORS WINDOWS	20.00	SQ. FT. MIN.	N/A		OK	RES. 28-25	(...)provided that such window shall be directly visible from 50% of the corridor or from the vertical circulation core, and
RECREATION SPACE	2,404.02	3.3 % MIN.	1,245.00 2,812.00 4,057.00	SQ.FT. (indoor) SQ.FT. (outdoor) Total	 OK	RES. 28-31	The amount of recreation space required is expressed as percentage of the total residential floor area or the
STANDARDS FOR RECREATION SPACE (outdoor)	15'-0" 225.00	FT. MIN. SQ.FT. MIN.	26'-8" 2,812.00	FT. SQ.FT.	OK OK	RES. 28-32	(...)The minimum dimension of any recreation space shall be 15'... Outdoor
PLANTING AREAS	REQUIRED B/W BLDB. & ST. LINE		located at perimeter		OK	RES. 28-33	The area of the zoning lot between the street line and the street wall of the building shall be planted, except at the entrances to and exits from the
DENSITY PER CORRIDOR	11 max. IN ORDER TO QUALIFY FOR DEDUCTION	D.U. IN R6	11(MAX)	D.U. on 5,6 & 7 frs.	OK	RES. 28-41	If the number of dwelling units served by a vertical circulation core and corridor on each story does not exceed the number set forth in the billowing table, 50% of the sq. ft. of the corridor serving such dwelling units on such story may be excluded from the definition of floor area.

ZONING CALCULATION

Address:	129-01 / 129-09 Jamaica Ave @ 127th St.			CONST. CLASS 1-B 2HR RATED
Block:	9821			ZONING USE GROUP - 2
Lot:	44			BUILDING CODE OCCUPANCY GROUP - R-2
Zoning:	R5/C2-3, R6A/C2-4			BUILDING TO BE FULLY SPRINKLERED
				BUILDING TO BE DESIGNED PER 2008 NYC BUILDING CODE
				DENSITY CALC: LOT = 1.7 ACRES = 36 UNITS PER ACRE
Map	14b			Non-Profit Res. For Elderly Reqd. Accesory Social & Welfare Facilities 4% Min

RESIDENTIAL	PERMITTED/REQUIRED		PROPOSED		REMARKS	RES.
Lot area						
R5						
Narrow Interior Lot			39,451.00	Sq.Ft.		23-32
R6A						
Corner Lot			10,154.10	Sq.Ft.		23-32
Interior Lot			24,621.20	Sq.Ft.		23-32
	1,700.00	Sq.Ft.	**74,206.30**	**Sq.Ft.**	OK	
Lot Coverage						
R5 Lot Coverage 55%	21,687.05	Sq. Ft. Max.	11,349.00		OK	23-141
R6A Corner Lot 80%	8,123.28	Sq. Ft. Max.	6,941.00		OK	23-145
R6A Interior Lot 65%	16,003.78	Sq. Ft. Max.	15,171.00		OK	23-145
F.A.R. Floor Area Ratio						
R5 ELDERLY	1.95	Max.	0.07		OK	23-147
R5 LOW INCOME	1.25	Max.	1.04		OK	23-141
R6A ELDERLY	3.90	Max.	1.72		OK	23-147
R6A LOW INCOME	3.00	Max.	2.11		OK	23-145
TOTAL ADJUSTED ELDERLY PERMITTED	2.86		0.84		OK	
TOTAL ADJUSTED LOW INCOME PERMITTED	2.07		1.54		OK	
TOTAL PERMITTED - ALL USES	2.86		2.39		OK	
GROSS FLOOR AREA						
R5 ELDERLY	76,890.45	Sq. Ft. Max.	2,871.00		OK	23-147
R5 LOW INCOME	49,238.75	Sq. Ft. Max.	41,048.00		OK	23-141
R6A ELDERLY	135,623.67	Sq. Ft. Max.	59,866.00		OK	23-147
R6A LOW INCOME	104,329.90	Sq. Ft. Max.	73,537.30		OK	23-145
TOTAL ELDERLY PERMITTED	212,514.12	Sq. Ft. Max.	62,537.00		OK	
TOTAL LOW INCOME PERMITTED	153,614.65	Sq. Ft. Max.	114,585.30		OK	
TOTAL PERMITTED - ALL USES COMBINED	212,514.12	Sq. Ft. Max.	177,122.30		OK	
No. of Apartments						
R5 ELDERLY DU FACTOR 700	110	Units (Max.)	5	D.U.	OK	23-221
R5 LOW INCOME DU FACTOR 760	65	Units (Max.)	46	D.U.	OK	23-22
R6A ELDERLY DU 710	191	Units (Max.)	60	D.U.	OK	23-221
R6A LOW INCOME DU FACTOR 680	153	Units (Max.)	71	D.U.	OK	23-22
Heights (feet)						
R5						
Max. Base Height		30'-0"	30'-0"		OK	23-431
Max Building Height		40'-0"	40'-0"		OK	23-431
R6A						
Min. Base Height		40'-0"	58'-8"		OK	23-433
Max. Base Height		60'-0"	58'-8"		OK	23-433
Max Building Height		70'-0"	68'-0"		OK	23-433
			30'-0"		OK	23-51
Special Provisions in R6 adjacent to lots entirley or partially in R5	Within 25' of the lot line of a lot entirely or partially in R5 our building cannot exceed a height of 30'-0"					
Yard Regulations						
R5						
Front	10'-0"	Min.	10'-0"		OK	23-45
Side	8'-0"	Min.	8'-0"		OK	23-51
Rear	30'-0"	Min.	30'-0"		OK	23-47
R6A						
Front	Not reqd.					23-45
Side	Not reqd.					23-462c
Rear	30'-0"	Min.	30'-0"		OK	23-47
Initial Set Back						
Wide Street	10'-0"		26'-7"		OK	23-433
Narrow Street	15'-0"		N/A		OK	23-433
Non-Profit Res. For Elderly Reqd. Accesory Social & Welfare Facilities 4% Min	2,501	Sq.Ft. Min	2,545	Sq.Ft.	OK	12-10

PARKING NON PROFIT RESIDENCE FOR THE ELDERLY AS DEFINED IN ZR 12-10	PERMITTED/REQUIRED		PROPOSED		REMARKS	RES.
R5 31.5%	2					25-25
R6A 18%	10					25-25
Total Req.	12	Spaces	**12**	**Spaces**	OK	25-261
Bicycle Parking						
1 Space per 10,000Sq.Ft.	6	Spaces (Min.)	6	Spaces	OK	25-811
15 Sq.Ft. per Bicicle	90	Sq.Ft. Min	90	Sq.Ft.	OK	

PARKING GOVERNMENT ASSISTED HOUSING	PERMITTED/REQUIRED		PROPOSED		REMARKS	RES.
R5 70%	32					25-25
R6A 38%	25					25-25
Total Req.	57	Spaces	58	Spaces	OK	25-261
Bicycle Parking						
1 Space per 2 dwelling units	59	Spaces (Min.)	59	Spaces	OK	25-811
15 Sq.Ft. per Bicicle	885	Sq.Ft. Min	1256	Sq.Ft.	OK	

PHASE 2 - LOW INCOME HOUSING AREAS			
FLOORS	R5	R6A	TOTALS
1	10262	11010	21272
2	10262	11010	21272
3	10262	11010	21272
4	10262	11010	21272
5	0	10577	10577
6	0	10577	10577
7	0	8343.3	8343.3
TOTALS	41048	73537.3	114585.3

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PROPOSED NEW DEVELOPMENT FOR:

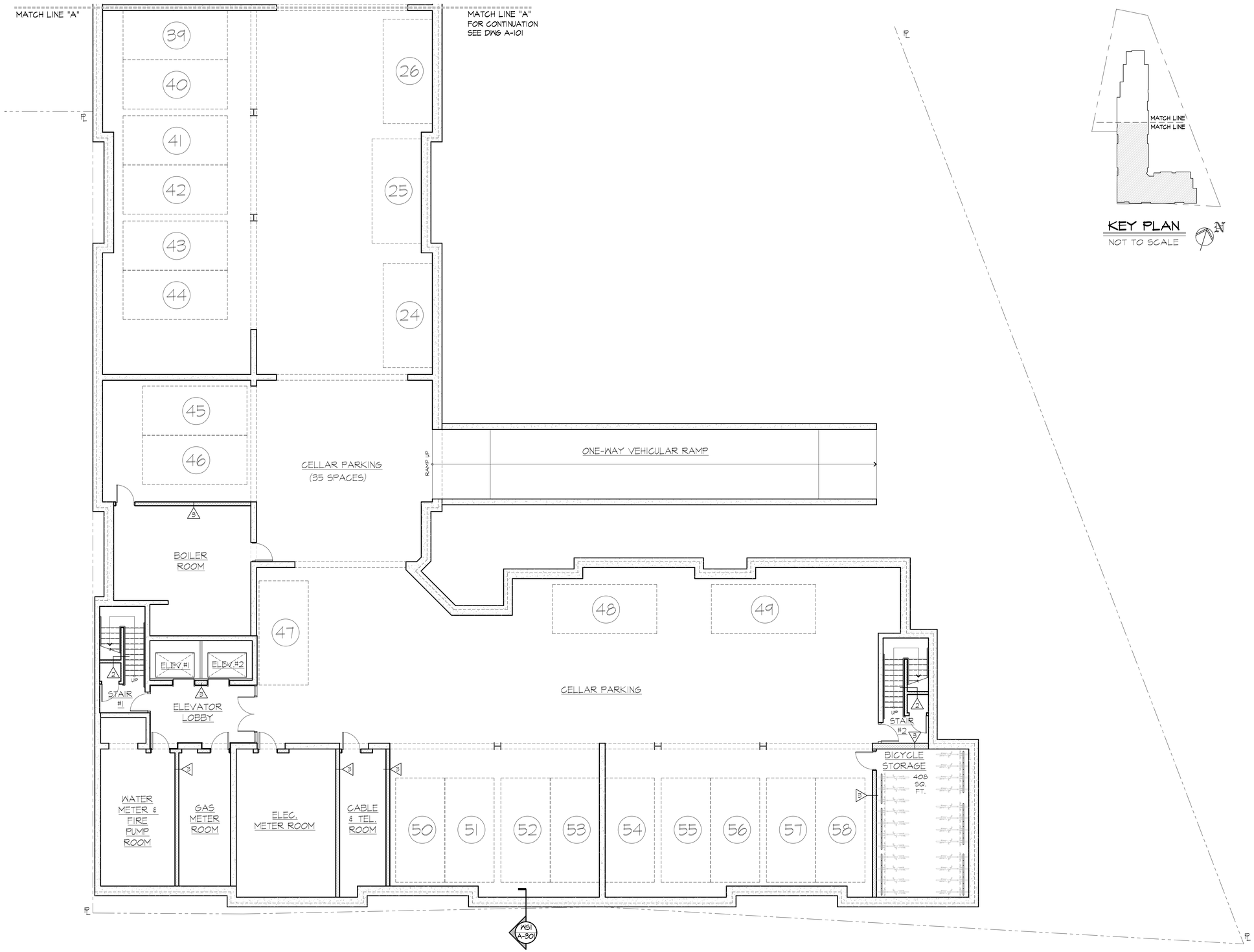
JAMAICA 2

129-09 JAMAICA AVENUE,QUEENS, NEW YORK

ZONING CALCULATIONS & HEIGHT DIAGRAMS

DATE:	XX/XX/XX
PROJECT NO:	0924
DRAWN BY:	AR
CHECKED BY:	
DRAWING NO:	Z-001.00
SCALE: AS NOTED	SHEET NO: 2 OF 22
NYC DOB NUMBER:	

0924-Z-001.00



PARTIAL CELLAR PLAN

SCALE : 1/8" = 1'-0"

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PROPOSED NEW DEVELOPMENT FOR:

JAMAICA 2

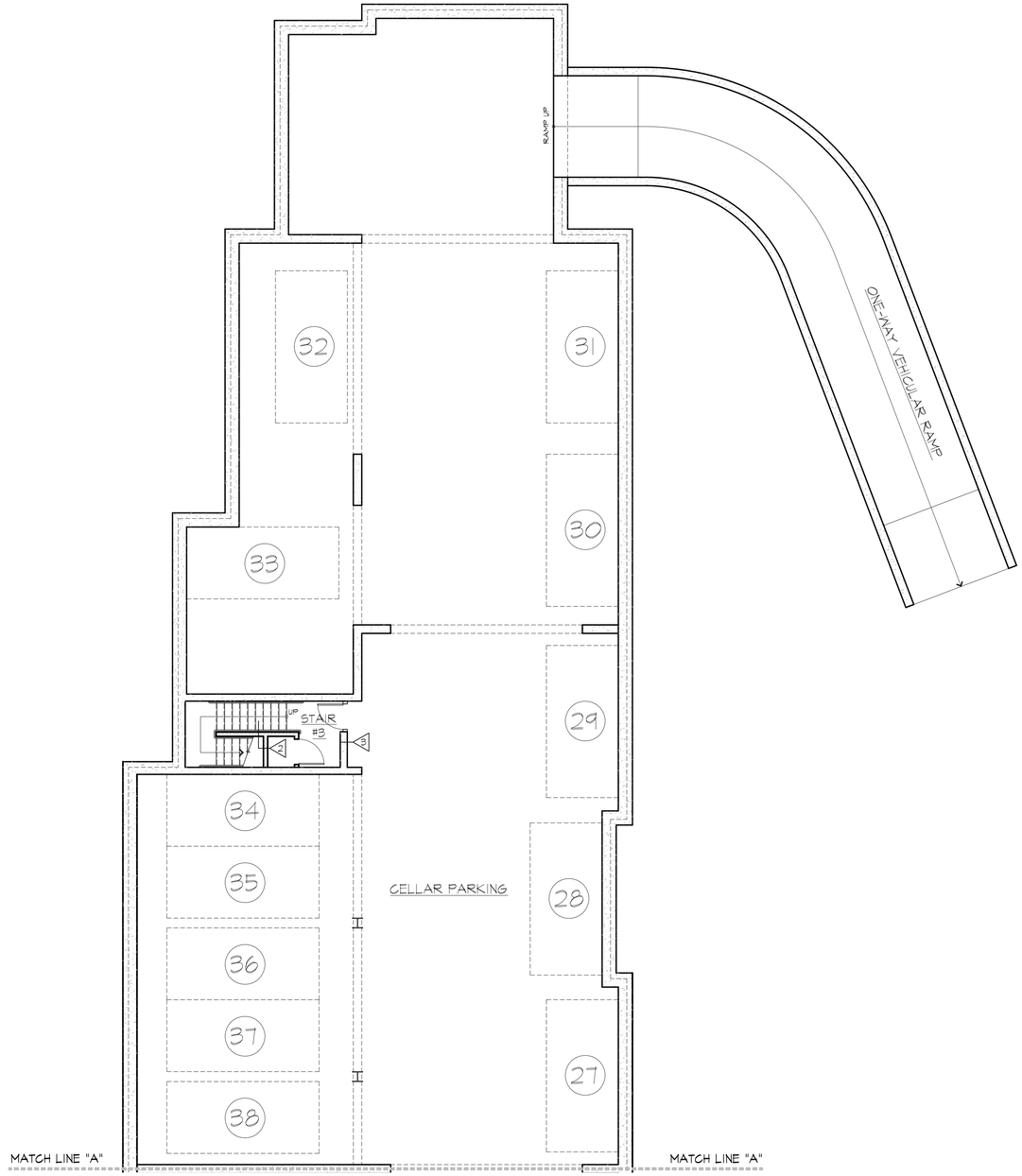
129-09 JAMAICA AVENUE, QUEENS, NEW YORK

PARTIAL CELLAR FLOOR PLAN

DATE:	XX-XX-XX
PROJECT NO:	0924
DRAWN BY:	AR
CHECKED BY:	
DRAWING NO:	A-100.00
SCALE: AS NOTED	SHEET NO: 4 OF 23

NYC DOB NUMBER:

0434-A-100



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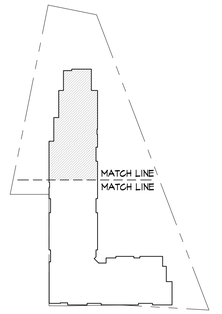

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PROPOSED NEW DEVELOPMENT FOR:

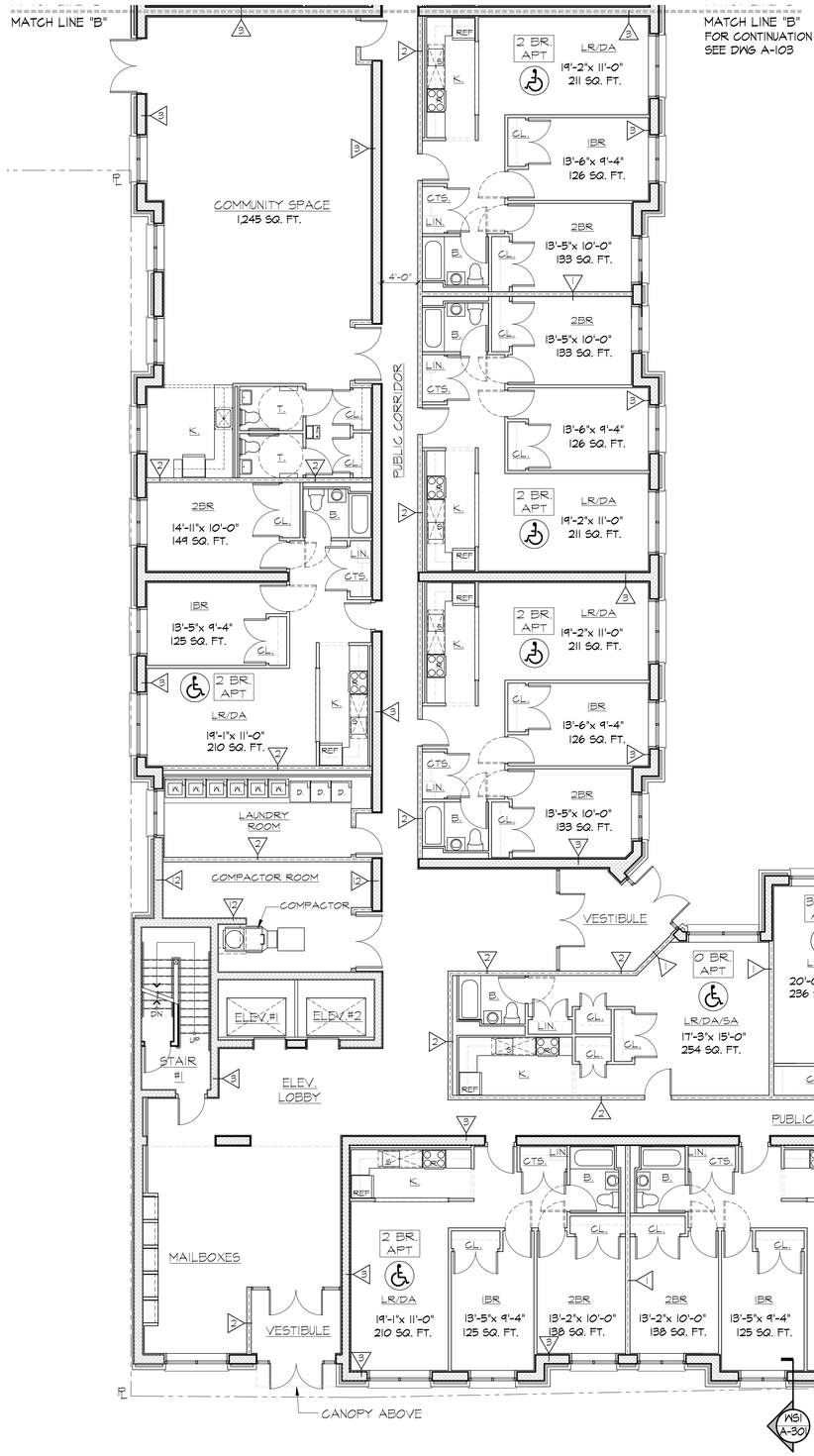
JAMAICA 2

129-09 JAMAICA AVENUE, QUEENS, NEW YORK

PARTIAL CELLAR FLOOR PLAN

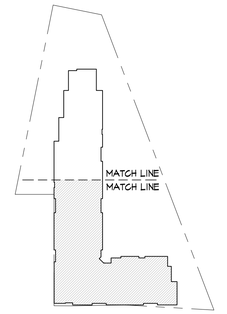
DATE:	XX-XX-XX
PROJECT NO:	0924
DRAWN BY:	AR
CHECKED BY:	
DRAWING NO:	A-101.00
SCALE: AS NOTED	SHEET NO: 5 OF 23
NYC DOB NUMBER:	

0434-A-101



PARTIAL FIRST FLOOR PLAN

SCALE : 1/8" = 1'-0"



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PROPOSED NEW DEVELOPMENT FOR:

JAMAICA 2

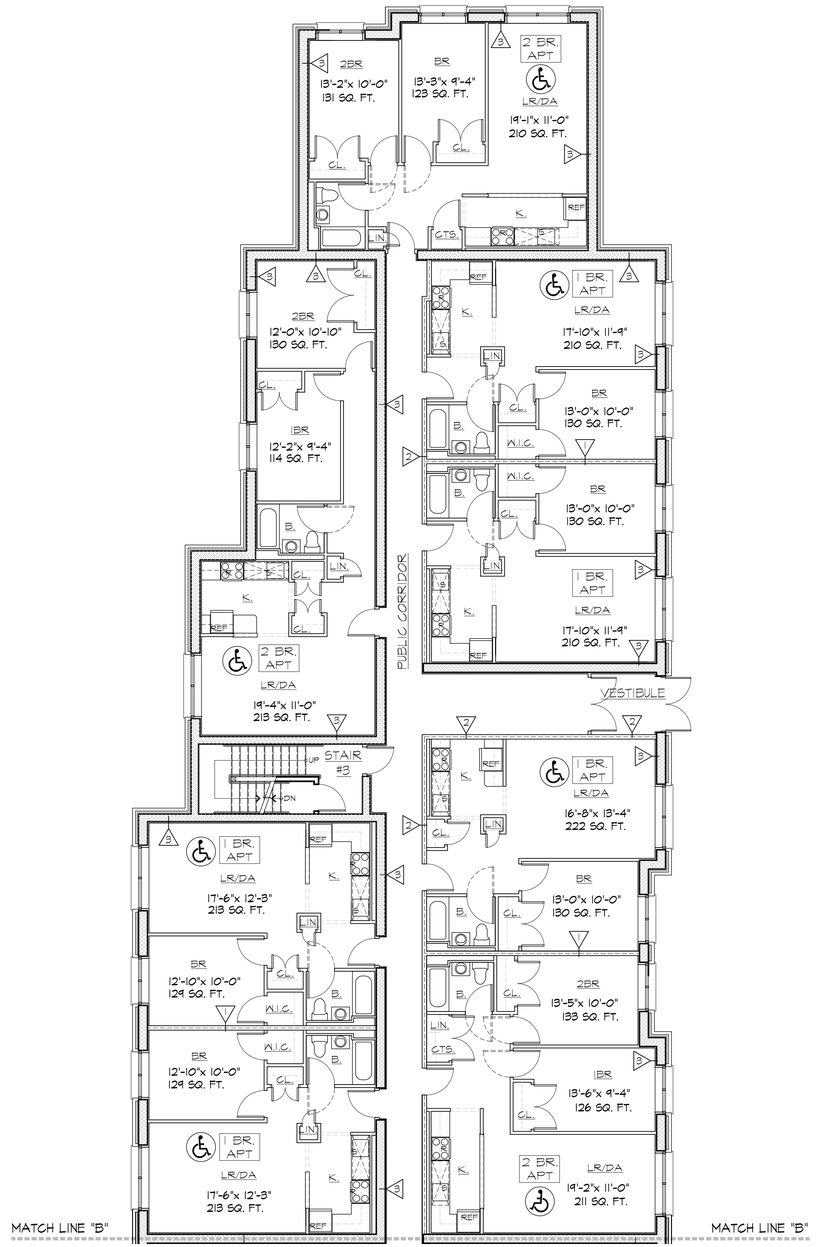
129-09 JAMAICA AVENUE, QUEENS, NEW YORK

PARTIAL FIRST FLOOR PLAN

DATE:	XX-XX-XX
PROJECT NO:	0924
DRAWN BY:	AR
CHECKED BY:	
DRAWING NO:	A-102.00
SCALE: AS NOTED	SHEET NO: 6 OF 23

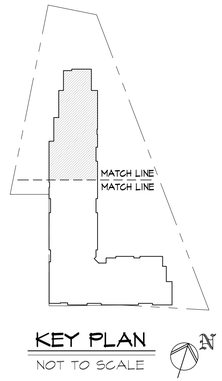
NYC DOB NUMBER:

0434-A-102



PARTIAL FIRST FLOOR PLAN

SCALE : 1/8" = 1'-0"



KEY PLAN

NOT TO SCALE

GENERAL NOTES

1. USE ENERGY STAR APPLIANCES, LIGHT FIXTURES AND HEATING SYSTEMS OR THE EQUIVALENT WHICH WILL PRODUCE THE SAME OR COMPARABLE ENERGY EFFICIENCY OR SAVINGS.
2. SELECT NATIVE OR NON INVASIVE NEW TREES AND PLANTS THAT ARE APPROPRIATE TO THE SITE'S SOIL AND MICROCLIMATE.
3. INSTALL WATER CONSERVING FIXTURES THROUGHOUT.
4. USE DAYLIGHT SENSORS OR TIMERS ON OUTDOOR LIGHTING TO MAXIMIZE ENERGY EFFICIENCY.
5. ALL INTERIOR PAINTS, PRIMERS, ADHESIVES AND SEALANTS MUST CONTAIN LOW OR NO VOCS.
6. GREEN LABEL CERTIFIED FLOOR COVERING: DO NOT INSTALL CARPETS IN BELOW GRADE LIVING SPACES, ENTRYWAYS, LAUNDRY ROOMS, BATHROOMS, KITCHENS OR UTILITY ROOMS. IF USING CARPET, USE PRODUCTS THAT MEET THE CARPET AND RUG INSTITUTE'S GREEN LABEL CERTIFIED CARPET, PAD AND CARPET ADHESIVES.
7. EXHAUST FANS - BATHROOM : INSTALL ENERGY STAR-LABELED BATHROOM FANS THAT EXHAUST TO THE OUTDOORS AND ARE EQUIPPED WITH A HUMIDISTAT SENSOR OR TIMER, OR OPERATE CONTINUOUSLY.
8. VENTILATION : INSTALL A VENTILATION SYSTEM FOR THE DWELLING UNIT THAT PROVIDES 15 CUBIC FEET PER MINUTE OF FRESH AIR, PER OCCUPANT.
9. WATER HEATERS : PREVENTION : INSTALL CONVENTIONAL HOT WATER HEATERS IN ROOMS WITH DRAINS OR CATCH PANS PIPED TO THE EXTERIOR OF THE DWELLING AND WITH NON-WATER SENSITIVE FLOOR COVERINGS.
10. WATER HEATERS: MINIMIZING CO: SPECIFY DIRECT VENTED OR COMBUSTION SEALED WATER HEATERS IF THE HEATER IS LOCATED IN A CONDITIONED SPACE.
11. COLD WATER PIPE INSULATION: INSULATE EXPOSED COLD WATER PIPES.
12. MATERIALS IN WET AREAS: USE MATERIALS WITH SMOOTH, DURABLE, CLEANABLE SURFACES. DO NOT USE MOLD - PROPAGATING MATERIALS SUCH AS VINYL WALLPAPER AND UNSEALED GROUT.
13. CLOTHES DRYER EXHAUST: CLOTHES DRYERS MUST BE EXHAUSTED DIRECTLY TO THE OUTDOORS.
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15. REDUCED HEAT - ISLAND EFFECT: ROOFING AND PAVING: 1) USE ENERGY-STAR COMPLIANT AND HIGH - EMISSIVE ROOFING FOR THE ENTIRE ROOF 2) USE LIGHT - COLORED/HIGH - ALBEDO MATERIALS FOR HARDSCAPED AREAS.
16. PROVIDE SOUND ATTENUATION BATT INSULATION IN ALL WALLS BETWEEN LIVING ROOMS AND BEDROOMS AND IN ALL TENANT SEPARATION PARTITIONS THROUGHTOUT (TYP.)
17. ALL APARTMENT UNITS ARE HANDICAP ADAPTABLE UNLESS OTHERWISE NOTED

WALL TYPE LEGEND:

1 HOUR RATED TENANT SEPARATION PARTITION - (1) LAYER OF 5/8" TYPE "X" GYPSUM BOARD ON (1) SIDE, (2) LAYERS OF 5/8" TYPE "X" GYPSUM BOARD ON OTHER SIDE OF 3-5/8" METAL STUDS @ 16" O.C. WITH 3-1/2" SOUND ATTENUATION INSULATION. EXTEND STUDS & GYPSUM BOARD UP TO UNDERSIDE OF CONCRETE DECK & SEAL TIGHT TO UNDERSIDE OF CONCRETE DECK AND/OR ROOF DECK W/ FIRESTOP SEALANT, WHICH EVER IS APPLICABLE. (GA FILE #WP-1052) (STC 50-54)

2 HOUR RATED PARTITION - (2) LAYERS 5/8" TYPE "X" GYPSUM BOARD ON EACH SIDE OF 3-5/8" 20 GAUGE METAL STUDS @ 16" O.C. WITH 3-1/2" SOUND ATTENUATION INSULATION. EXTEND GYPSUM BOARD & STUDS UP TO UNDERSIDE OF FLOOR DECK OR ROOF DECK. SEAL TIGHT TO DECK WITH FIRESTOP SEALANT. (GA FILE #WP-1522 STC 55-59).

3 HOUR RATED CONCRETE BLOCK WALL WITH GALVANIZED HORIZONTAL TRUSS TYPE REINFORCING AT ALTERNATE COURSES. SEAL TOP OF CONCRETE BLOCK WALL TIGHT TO UNDERSIDE OF CONCRETE PLANK OR DECK ABOVE WITH FIRESTOP SEALANT AND/OR FIRESAFING INSULATION AS REQUIRED (UL #906)

LEGEND:

- CONCRETE FOUNDATION WALL
- CONCRETE BLOCK WALL
- H.V.I. — UNIT DESIGNATED & OUTFITTED AS FULLY ACCESSIBLE FOR PERSONS WITH HEARING OR VISION IMPAIRMENT. (3 UNITS)
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- H.P. — HEAT PUMPS (ENERGY-STAR RATED)
- E.P.C. — EMERGENCY FULL CHORD

DATE	REVISIONS
09-10-10	ISSUED TO HPD / DACE FOR REVIEW AND COMMENT

HUGO S. SUBOTOVSKY AIA architects LLC

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121 WEST 27TH STREET, NEW YORK,NY 10001 TEL: 212-242-5321 FAX: 800-772-8304

PROPOSED NEW DEVELOPMENT FOR:

JAMAICA 2

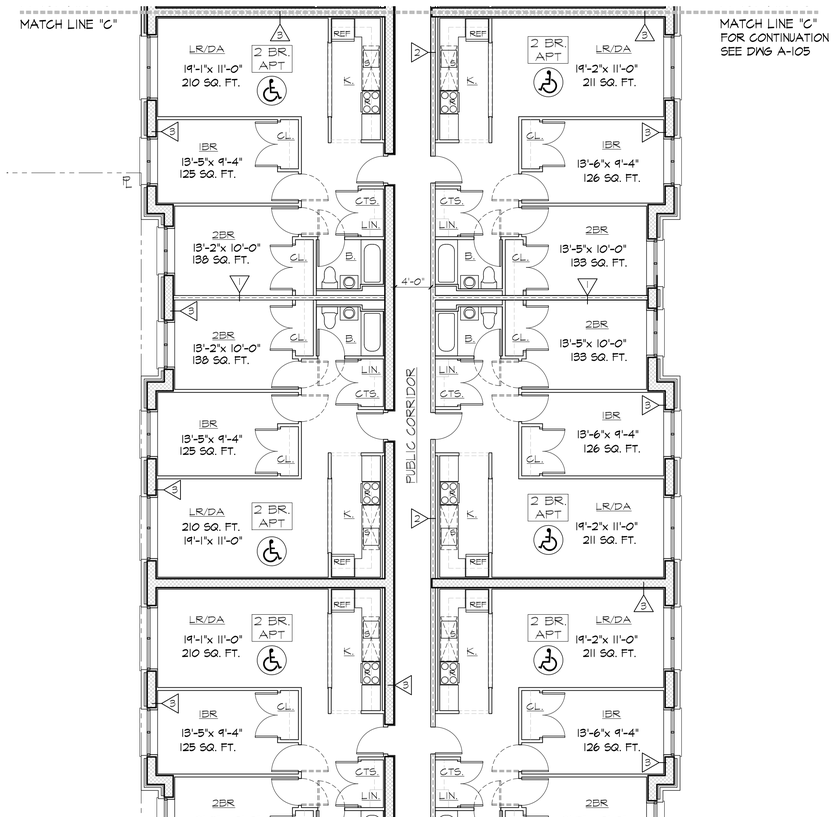
129-09 JAMAICA AVENUE, QUEENS, NEW YORK

PARTIAL FIRST FLOOR PLAN

DATE:	XX-XX-XX
PROJECT NO:	0924
DRAWN BY:	AR
CHECKED BY:	
DRAWING NO:	A-103.00
SCALE: AS NOTED	SHEET NO: 7 OF 23

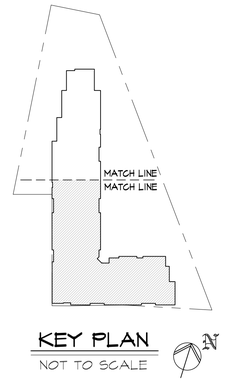
NYC DOB NUMBER:

0434-A-103



PARTIAL 2ND FLOOR PLAN

SCALE : 1/8" = 1'-0"



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PROPOSED NEW DEVELOPMENT FOR:

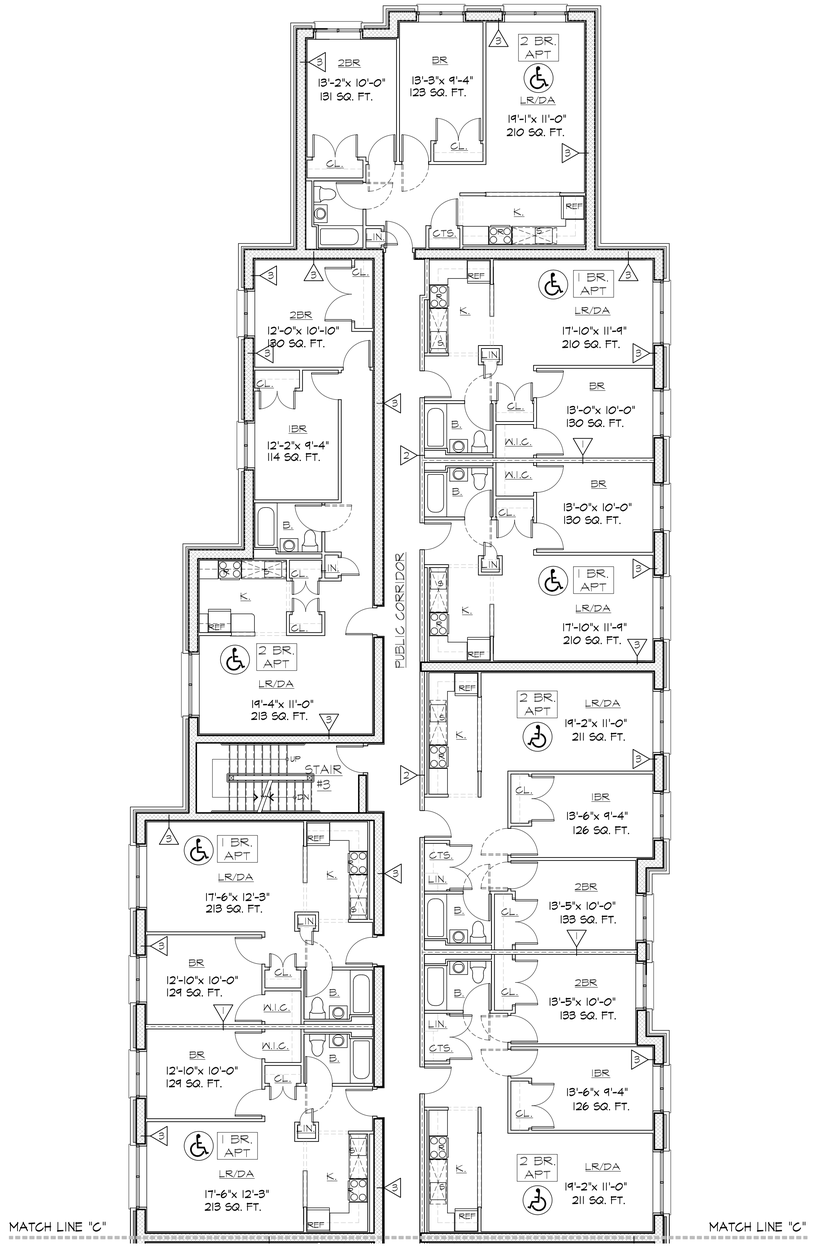
JAMAICA 2

129-09 JAMAICA AVENUE, QUEENS, NEW YORK

PARTIAL SECOND FLOOR PLAN

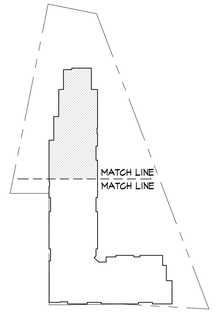
DATE:	XX-XX-XX
PROJECT NO:	0924
DRAWN BY:	AR
CHECKED BY:	
DRAWING NO:	A-104.00
SCALE: AS NOTED	SHEET NO: 8 OF 23
NYC DOB NUMBER:	

0434-A-104



PARTIAL 2ND FLOOR PLAN

SCALE : 1/8" = 1'-0"



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PROPOSED NEW DEVELOPMENT FOR:

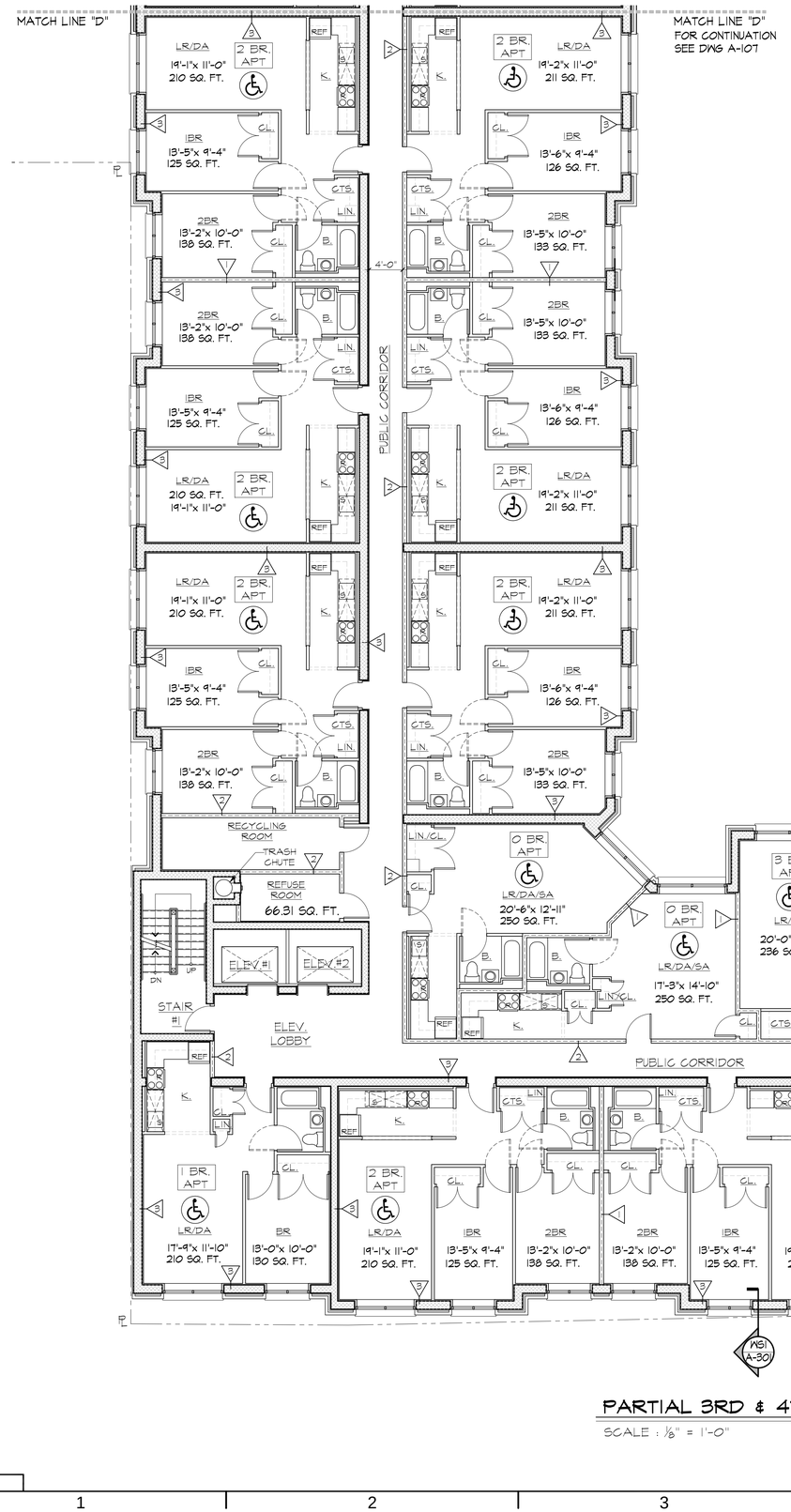
JAMAICA 2

129-09 JAMAICA AVENUE, QUEENS, NEW YORK

PARTIAL SECOND FLOOR PLAN

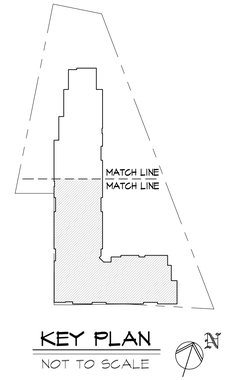
DATE:	XX-XX-XX
PROJECT NO:	0924
DRAWN BY:	AR
CHECKED BY:	
DRAWING NO:	A-105.00
SCALE: AS NOTED	SHEET NO: 9 OF 23
NYC DOB NUMBER:	

0434-A-105



PARTIAL 3RD & 4TH FLOOR PLANS

SCALE : 1/8" = 1'-0"



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PROPOSED NEW DEVELOPMENT FOR:

JAMAICA 2

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PARTIAL 3RD & 4TH FLOOR PLANS

DATE:	XX-XX-XX
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DRAWN BY:	AR
CHECKED BY:	
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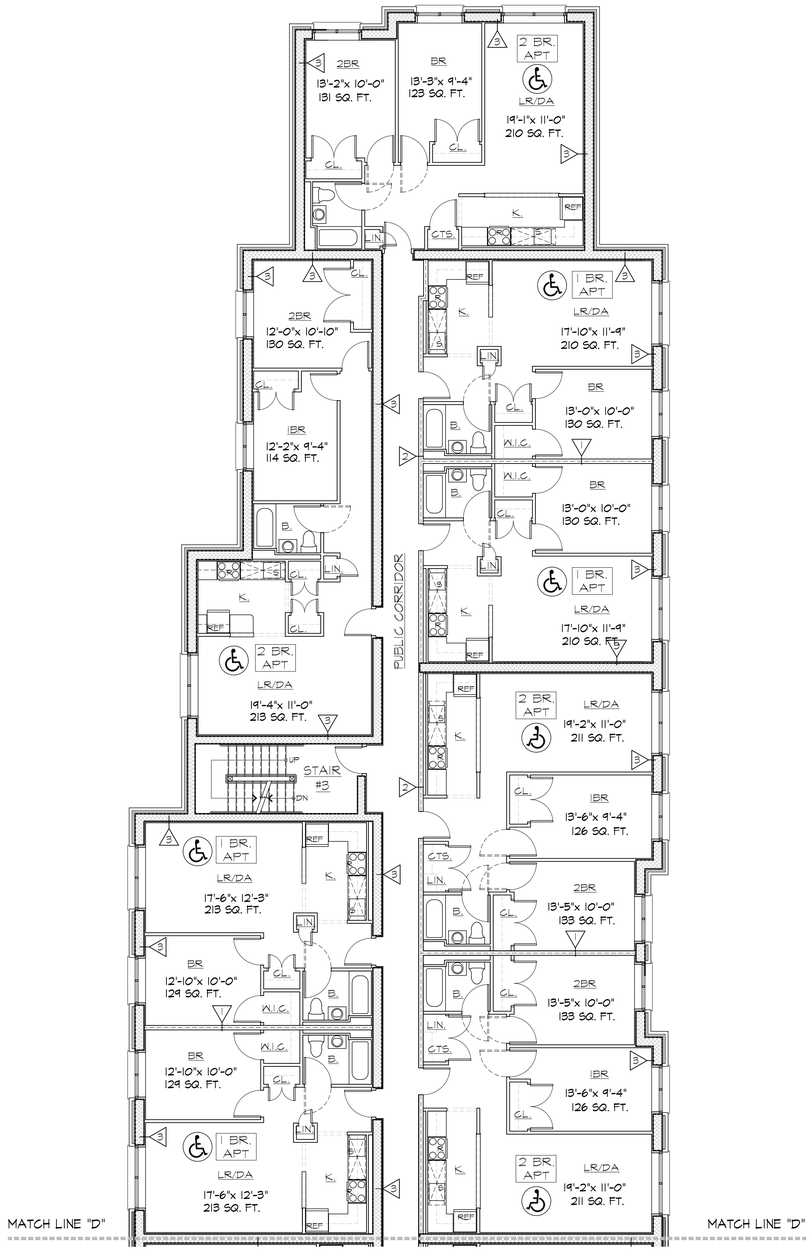
SCALE: AS NOTED	SHEET NO: 10 OF 23

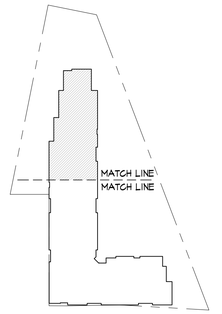
NYC DOB NUMBER:

0434-A-106



PARTIAL 3RD & 4TH FLOOR PLAN

SCALE : 1/8" = 1'-0"



KEY PLAN

NOT TO SCALE

N

GENERAL NOTES

1. USE ENERGY STAR APPLIANCES, LIGHT FIXTURES AND HEATING SYSTEMS OR THE EQUIVALENT WHICH WILL PRODUCE THE SAME OR COMPARABLE ENERGY EFFICIENCY OR SAVINGS.
2. SELECT NATIVE OR NON INVASIVE NEW TREES AND PLANTS THAT ARE APPROPRIATE TO THE SITE'S SOIL AND MICROCLIMATE.
3. INSTALL WATER CONSERVING FIXTURES THROUGHOUT.
4. USE DAYLIGHT SENSORS OR TIMERS ON OUTDOOR LIGHTING TO MAXIMIZE ENERGY EFFICIENCY.
5. ALL INTERIOR PAINTS, PRIMERS, ADHESIVES AND SEALANTS MUST CONTAIN LOW OR NO VOCS.
6. GREEN LABEL CERTIFIED FLOOR COVERING: DO NOT INSTALL CARPETS IN BELOW GRADE LIVING SPACES, ENTRYWAYS, LAUNDRY ROOMS, BATHROOMS, KITCHENS OR UTILITY ROOMS. IF USING CARPET, USE PRODUCTS THAT MEET THE CARPET AND RUG INSTITUTE'S GREEN LABEL CERTIFIED CARPET, PAD AND CARPET ADHESIVES.
7. EXHAUST FANS - BATHROOM : INSTALL ENERGY STAR-LABELED BATHROOM FANS THAT EXHAUST TO THE OUTDOORS AND ARE EQUIPPED WITH A HUMIDISTAT SENSOR OR TIMER, OR OPERATE CONTINUOUSLY.
8. VENTILATION : INSTALL A VENTILATION SYSTEM FOR THE DWELLING UNIT THAT PROVIDES 15 CUBIC FEET PER MINUTE OF FRESH AIR, PER OCCUPANT.
9. WATER HEATERS : PREVENTION : INSTALL CONVENTIONAL HOT WATER HEATERS IN ROOMS WITH DRAINS OR CATCH PANS PIPED TO THE EXTERIOR OF THE DWELLING AND WITH NON-WATER SENSITIVE FLOOR COVERINGS.
10. WATER HEATERS: MINIMIZING CO: SPECIFY DIRECT VENTED OR COMBUSTION SEALED WATER HEATERS IF THE HEATER IS LOCATED IN A CONDITIONED SPACE.
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12. MATERIALS IN WET AREAS: USE MATERIALS WITH SMOOTH, DURABLE, CLEANABLE SURFACES. DO NOT USE MOLD - PROPAGATING MATERIALS SUCH AS VINYL WALLPAPER AND UNSEALED GROUT.
13. CLOTHES DRYER EXHAUST: CLOTHES DRYERS MUST BE EXHAUSTED DIRECTLY TO THE OUTDOORS.
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15. REDUCED HEAT - ISLAND EFFECT: ROOFING AND PAVING: 1) USE ENERGY-STAR COMPLIANT AND HIGH - EMISSIVE ROOFING FOR THE ENTIRE ROOF 2) USE LIGHT - COLORED/HIGH - ALBEDO MATERIALS FOR HARDSCAPED AREAS.
16. PROVIDE SOUND ATTENUATION BATT INSULATION IN ALL WALLS BETWEEN LIVING ROOMS AND BEDROOMS AND IN ALL TENANT SEPARATION PARTITIONS THROUGHTOUT (TYP.)
17. ALL APARTMENT UNITS ARE HANDICAP ADAPTABLE UNLESS OTHERWISE NOTED

WALL TYPE LEGEND:

1 HOUR RATED TENANT SEPARATION PARTITION - (1) LAYER OF 5/8" TYPE "X" GYPSUM BOARD ON (1) SIDE, (2) LAYERS OF 5/8" TYPE "X" GYPSUM BOARD ON OTHER SIDE OF 3-5/8" METAL STUDS @ 16" O.C. WITH 3-1/2" SOUND ATTENUATION INSULATION. EXTEND STUDS & GYPSUM BOARD UP TO UNDERSIDE OF CONCRETE DECK & SEAL TIGHT TO UNDERSIDE OF CONCRETE DECK AND/OR ROOF DECK W/ FIRESTOP SEALANT, WHICH EVER IS APPLICABLE. (GA FILE #NP-1052) (STC 50-54)

2 HOUR RATED PARTITION - (2) LAYERS 5/8" TYPE "X" GYPSUM BOARD ON EACH SIDE OF 3-5/8" 20 GAUGE METAL STUDS @ 16" O.C. WITH 3-1/2" SOUND ATTENUATION INSULATION. EXTEND GYPSUM BOARD & STUDS UP TO UNDERSIDE OF FLOOR DECK OR ROOF DECK. SEAL TIGHT TO DECK WITH FIRESTOP SEALANT. (GA FILE #NP-1522 STC 55-59).

3 2 HOUR RATED CONCRETE BLOCK WALL WITH GALVANIZED HORIZONTAL TRUSS TYPE REINFORCING AT ALTERNATE COURSES. SEAL TOP OF CONCRETE BLOCK WALL TIGHT TO UNDERSIDE OF CONCRETE PLANK OR DECK ABOVE WITH FIRESTOP SEALANT AND/OR FIRESAFING INSULATION AS REQUIRED (UL #906)

LEGEND:

CONCRETE FOUNDATION WALL

CONCRETE BLOCK WALL

H.V.I. — UNIT DESIGNATED & OUTFITTED AS FULLY ACCESSIBLE FOR PERSONS WITH HEARING OR VISION IMPAIRMENT. (3 UNITS)

UNIT DESIGNATED & OUTFITTED AS FULLY ACCESSIBLE & ADAPTED, MOVE IN READY, FOR PERSONS WITH A MOBILITY IMPAIRMENT. (7 UNITS)

H.P. — HEAT PUMPS (ENERGY-STAR RATED)

E.P.C. — EMERGENCY FULL CHORD

DATE	REVISIONS
09-10-10	ISSUED TO HPD / DACE FOR REVIEW AND COMMENT

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121 WEST 27TH STREET, NEW YORK,NY 10001 TEL: 212-242-5321 FAX: 800-772-8304

PROPOSED NEW DEVELOPMENT FOR:

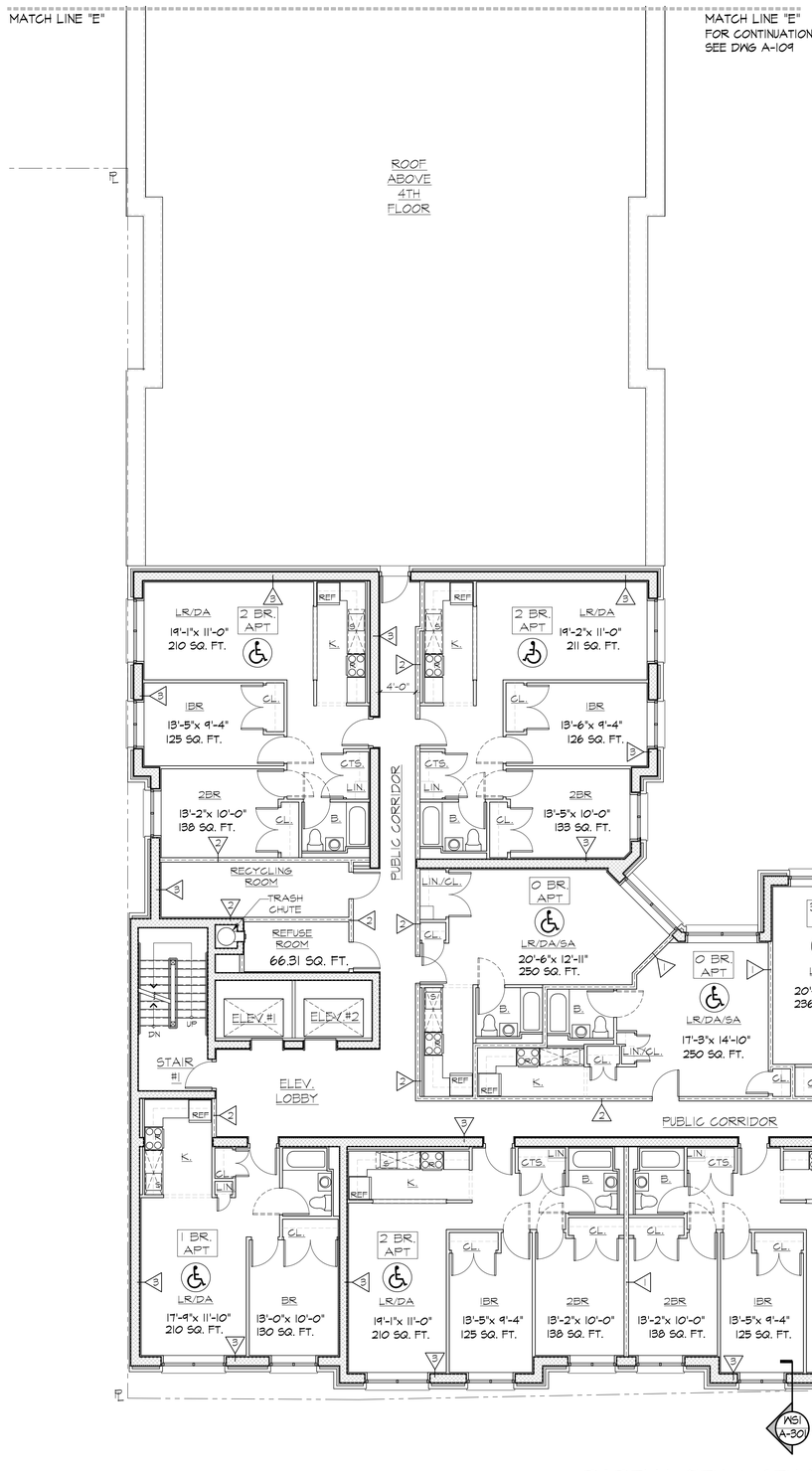
JAMAICA 2

129-09 JAMAICA AVENUE, QUEENS, NEW YORK

PARTIAL 3RD & 4TH FLOOR PLANS

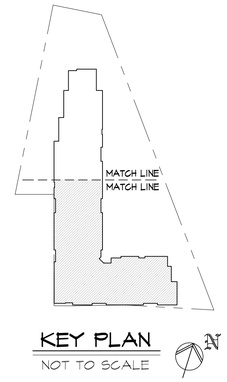
DATE:	XX-XX-XX
PROJECT NO:	0924
DRAWN BY:	AR
CHECKED BY:	
DRAWING NO:	A-107.00
SCALE: AS NOTED	SHEET NO: 11 OF 23
NYC DOB NUMBER:	

0434-A-107



PARTIAL 5TH & 6TH FLOOR PLANS

SCALE : 1/8" = 1'-0"



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PROPOSED NEW DEVELOPMENT FOR:

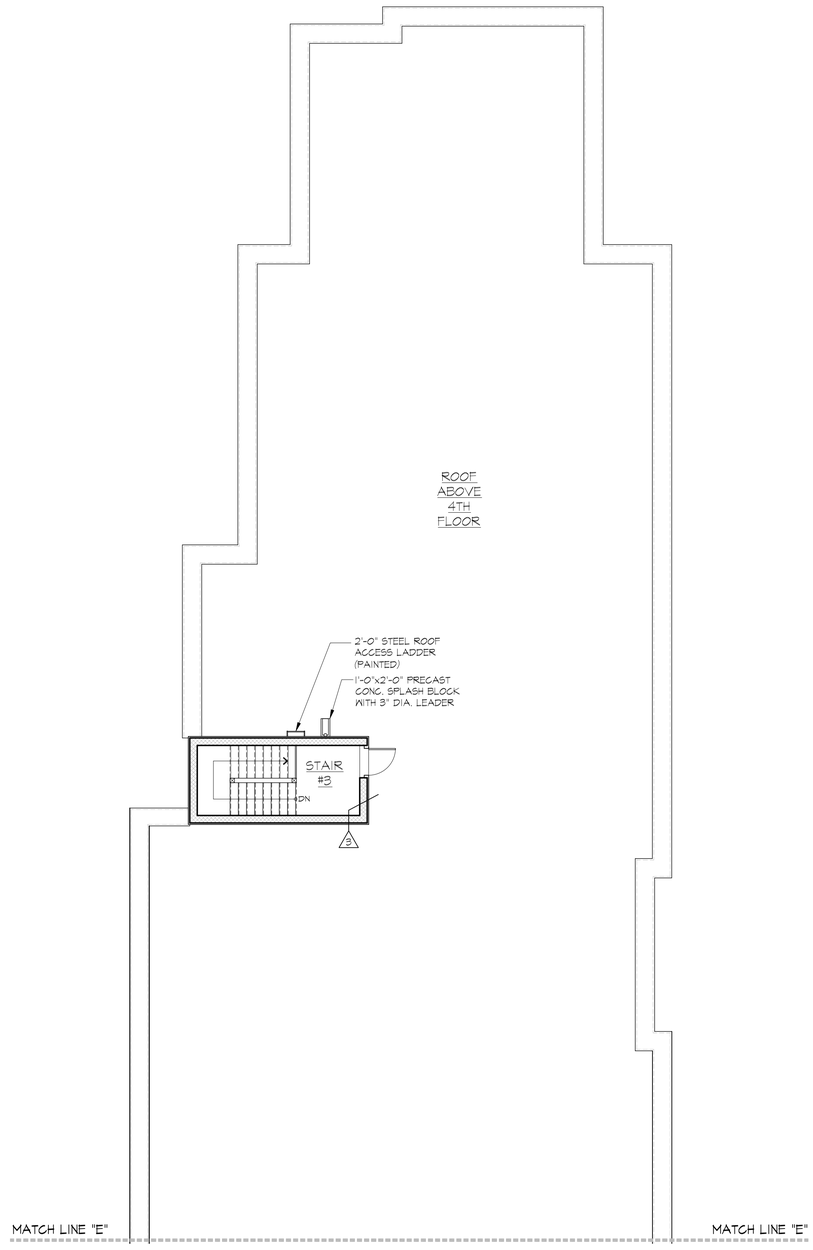
JAMAICA 2

129-09 JAMAICA AVENUE, QUEENS, NEW YORK

PARTIAL 5TH & 6TH FLOOR PLANS

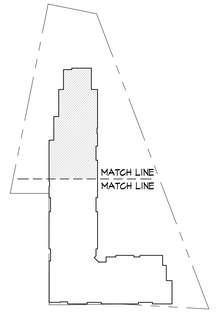
DATE:	XX-XX-XX
PROJECT NO:	0924
DRAWN BY:	AR
CHECKED BY:	
DRAWING NO:	A-108.00
SCALE: AS NOTED	SHEET NO: 12 OF 23
NYC DOB NUMBER:	

0434-A-108



PARTIAL 5TH & 6TH FLOOR PLANS

SCALE : 1/8" = 1'-0"



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PROPOSED NEW DEVELOPMENT FOR:

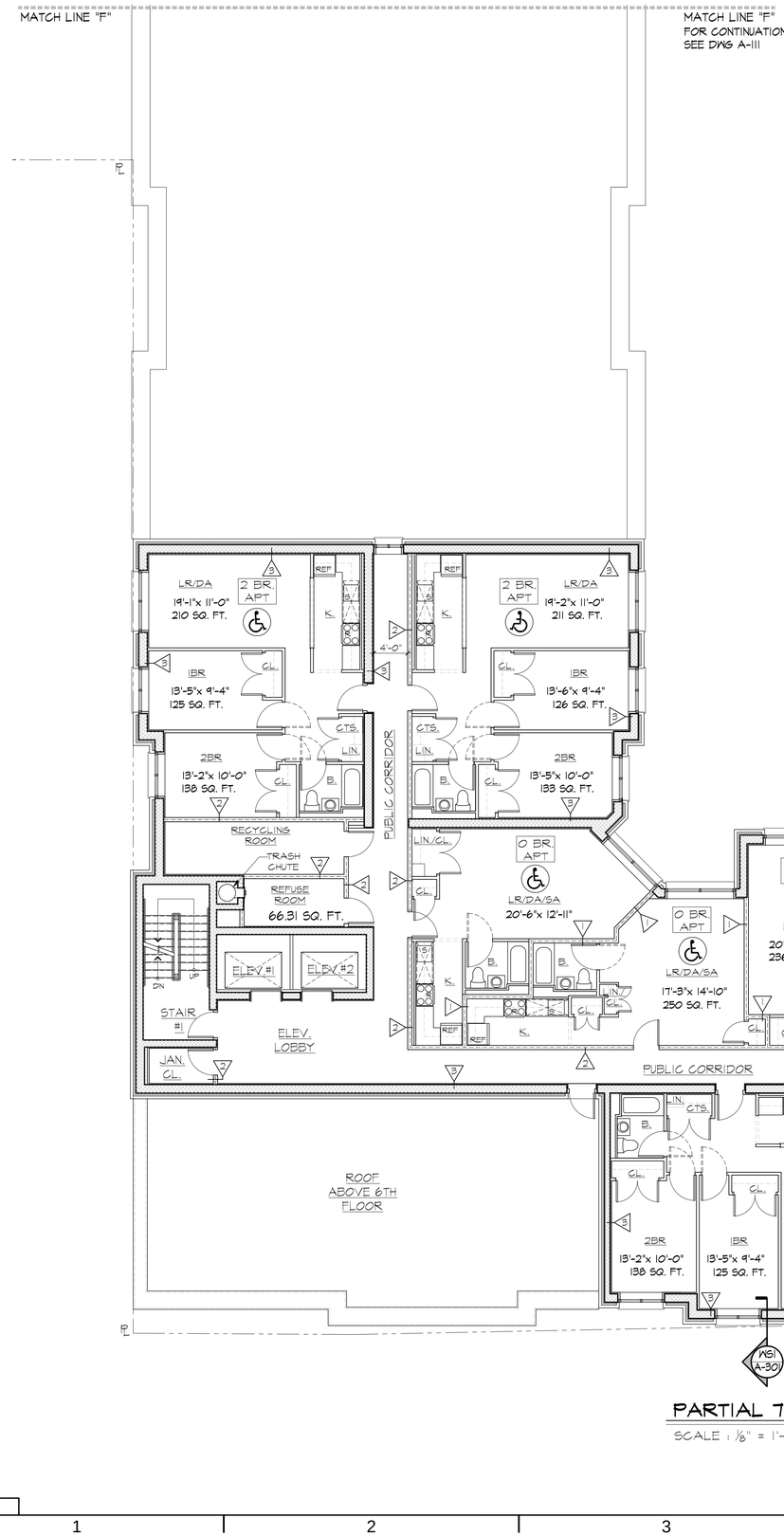
JAMAICA 2

129-09 JAMAICA AVENUE, QUEENS, NEW YORK

PARTIAL 5TH & 6TH FLOOR PLANS

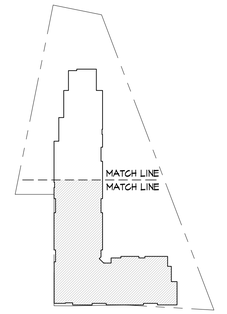
DATE:	XX-XX-XX
PROJECT NO:	0924
DRAWN BY:	AR
CHECKED BY:	
DRAWING NO:	A-109.00
SCALE: AS NOTED	SHEET NO: 13 OF 23
NYC DOB NUMBER:	

0434-A-109



PARTIAL 7TH FLOOR PLAN

SCALE : 1/8" = 1'-0"



KEY PLAN

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PROPOSED NEW DEVELOPMENT FOR:

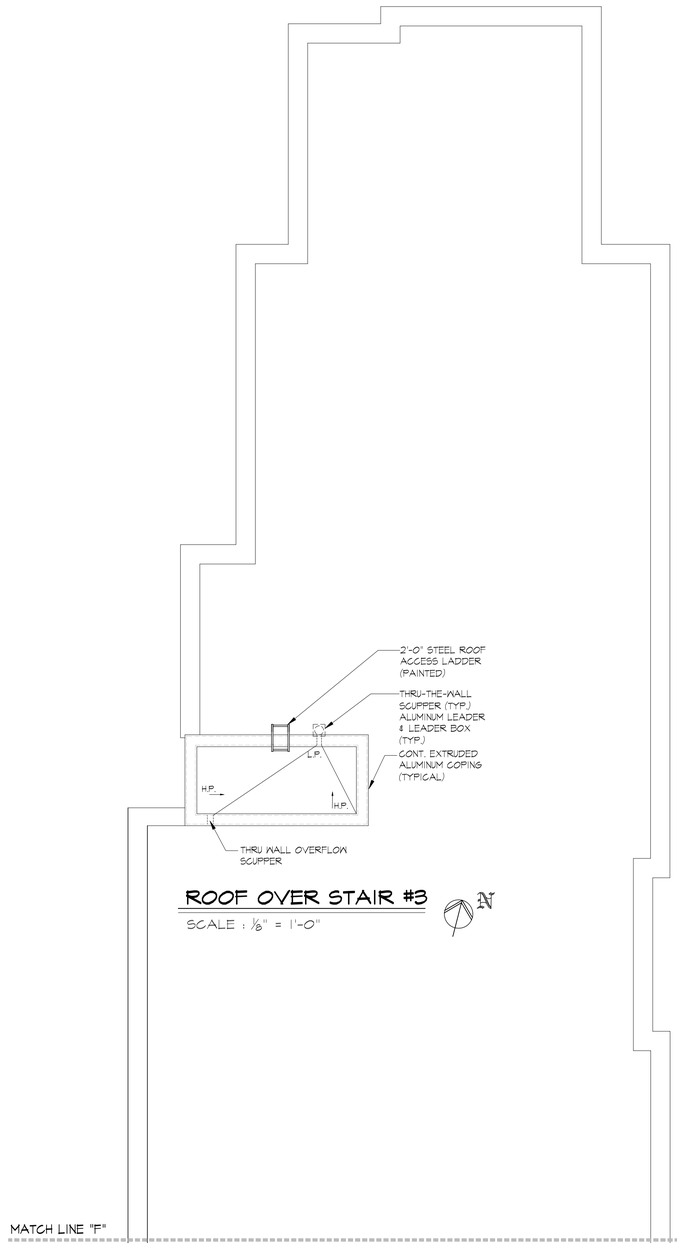
JAMAICA 2

129-09 JAMAICA AVENUE, QUEENS, NEW YORK

PARTIAL 7TH FLOOR PLAN

DATE:	XX-XX-XX
PROJECT NO:	0924
DRAWN BY:	AR
CHECKED BY:	
DRAWING NO:	A-110.00
SCALE: AS NOTED	SHEET NO: 14 OF 23
NYC DOB NUMBER:	

0434-A-110

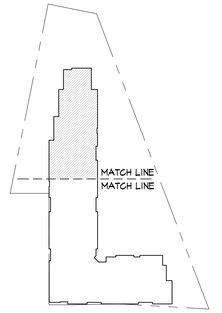


ROOF OVER STAIR #3

SCALE : 1/8" = 1'-0"

PARTIAL 7TH FLOOR PLAN

SCALE : 1/8" = 1'-0"



KEY PLAN

NOT TO SCALE

GENERAL NOTES

1. USE ENERGY STAR APPLIANCES, LIGHT FIXTURES AND HEATING SYSTEMS OR THE EQUIVALENT WHICH WILL PRODUCE THE SAME OR COMPARABLE ENERGY EFFICIENCY OR SAVINGS.
2. SELECT NATIVE OR NON INVASIVE NEW TREES AND PLANTS THAT ARE APPROPRIATE TO THE SITE'S SOIL AND MICROCLIMATE.
3. INSTALL WATER CONSERVING FIXTURES THROUGHOUT.
4. USE DAYLIGHT SENSORS OR TIMERS ON OUTDOOR LIGHTING TO MAXIMIZE ENERGY EFFICIENCY.
5. ALL INTERIOR PAINTS, PRIMERS, ADHESIVES AND SEALANTS MUST CONTAIN LOW OR NO VOCS.
6. GREEN LABEL CERTIFIED FLOOR COVERING: DO NOT INSTALL CARPETS IN BELOW GRADE LIVING SPACES, ENTRYWAYS, LAUNDRY ROOMS, BATHROOMS, KITCHENS OR UTILITY ROOMS. IF USING CARPET, USE PRODUCTS THAT MEET THE CARPET AND RUG INSTITUTE'S GREEN LABEL CERTIFIED CARPET, PAD AND CARPET ADHESIVES.
7. EXHAUST FANS - BATHROOM : INSTALL ENERGY STAR-LABELED BATHROOM FANS THAT EXHAUST TO THE OUTDOORS AND ARE EQUIPPED WITH A HUMIDISTAT SENSOR OR TIMER, OR OPERATE CONTINUOUSLY.
8. VENTILATION : INSTALL A VENTILATION SYSTEM FOR THE DWELLING UNIT THAT PROVIDES 15 CUBIC FEET PER MINUTE OF FRESH AIR, PER OCCUPANT.
9. WATER HEATERS : PREVENTION : INSTALL CONVENTIONAL HOT WATER HEATERS IN ROOMS WITH DRAINS OR CATCH PANS PIPED TO THE EXTERIOR OF THE DWELLING AND WITH NON-WATER SENSITIVE FLOOR COVERINGS.
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12. MATERIALS IN WET AREAS: USE MATERIALS WITH SMOOTH, DURABLE, CLEANABLE SURFACES. DO NOT USE MOLD - PROPAGATING MATERIALS SUCH AS VINYL WALLPAPER AND UNSEALED GROUT.
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15. REDUCED HEAT - ISLAND EFFECT: ROOFING AND PAVING: 1) USE ENERGY-STAR COMPLIANT AND HIGH - EMISSIVE ROOFING FOR THE ENTIRE ROOF 2) USE LIGHT - COLORED/HIGH - ALBEDO MATERIALS FOR HARDSCAPED AREAS.
16. PROVIDE SOUND ATTENUATION BATT INSULATION IN ALL WALLS BETWEEN LIVING ROOMS AND BEDROOMS AND IN ALL TENANT SEPARATION PARTITIONS THROUGHOUT (TYP.)
17. ALL APARTMENT UNITS ARE HANDICAP ADAPTABLE UNLESS OTHERWISE NOTED

WALL TYPE LEGEND:

1. 1 HOUR RATED TENANT SEPARATION PARTITION - (1) LAYER OF 5/8" TYPE "X" GYPSUM BOARD ON (1) SIDE, (2) LAYERS OF 5/8" TYPE "X" GYPSUM BOARD ON OTHER SIDE OF 3-5/8" METAL STUDS @ 16" O.C. WITH 3-1/2" SOUND ATTENUATION INSULATION. EXTEND STUDS & GYPSUM BOARD UP TO UNDERSIDE OF CONCRETE DECK & SEAL TIGHT TO UNDERSIDE OF CONCRETE DECK AND/OR ROOF DECK W/ FIRESTOP SEALANT, WHICH EVER IS APPLICABLE. (GA FILE #AP-1052) (STC 50-54)
2. 2 HOUR RATED PARTITION - (2) LAYERS 5/8" TYPE "X" GYPSUM BOARD ON EACH SIDE OF 3-5/8" 20 GAUGE METAL STUDS @ 16" O.C. WITH 3-1/2" SOUND ATTENUATION INSULATION. EXTEND GYPSUM BOARD & STUDS UP TO UNDERSIDE OF FLOOR DECK OR ROOF DECK. SEAL TIGHT TO DECK WITH FIRESTOP SEALANT. (GA FILE #AP-1522 STC 55-59).
3. 2 HOUR RATED CONCRETE BLOCK WALL WITH GALVANIZED HORIZONTAL TRUSS TYPE REINFORCING AT ALTERNATE COURSES. SEAL TOP OF CONCRETE BLOCK WALL TIGHT TO UNDERSIDE OF CONCRETE PLANK OR DECK ABOVE WITH FIRESTOP SEALANT AND/OR FIRESAFING INSULATION AS REQUIRED (UL #906)

LEGEND:

- CONCRETE FOUNDATION WALL
- CONCRETE BLOCK WALL
- H.V.I. — UNIT DESIGNATED & OUTFITTED AS FULLY ACCESSIBLE FOR PERSONS WITH HEARING OR VISION IMPAIRMENT. (3 UNITS)
- UNIT DESIGNATED & OUTFITTED AS FULLY ACCESSIBLE & ADAPTED, MOVE IN READY, FOR PERSONS WITH A MOBILITY IMPAIRMENT. (7 UNITS)
- H.P. — HEAT PUMPS (ENERGY-STAR RATED)
- E.P.C. — EMERGENCY PULL CHORD

DATE	REVISIONS
09-10-10	ISSUED TO HPD / DACE FOR REVIEW AND COMMENT

HUGO S. SUBOTOVSKY AIA architects LLC

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PROPOSED NEW DEVELOPMENT FOR:

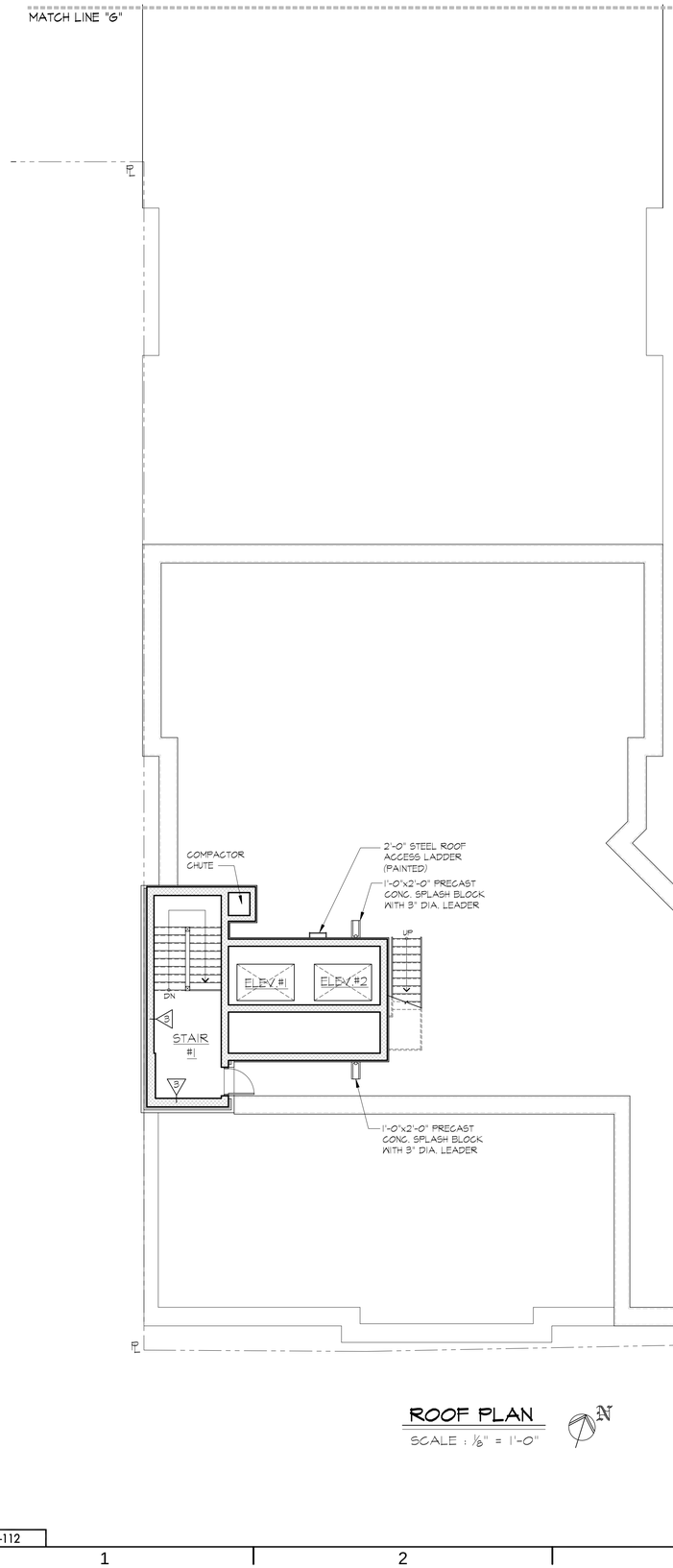
JAMAICA 2

129-09 JAMAICA AVENUE, QUEENS, NEW YORK

PARTIAL 7TH FLOOR PLAN

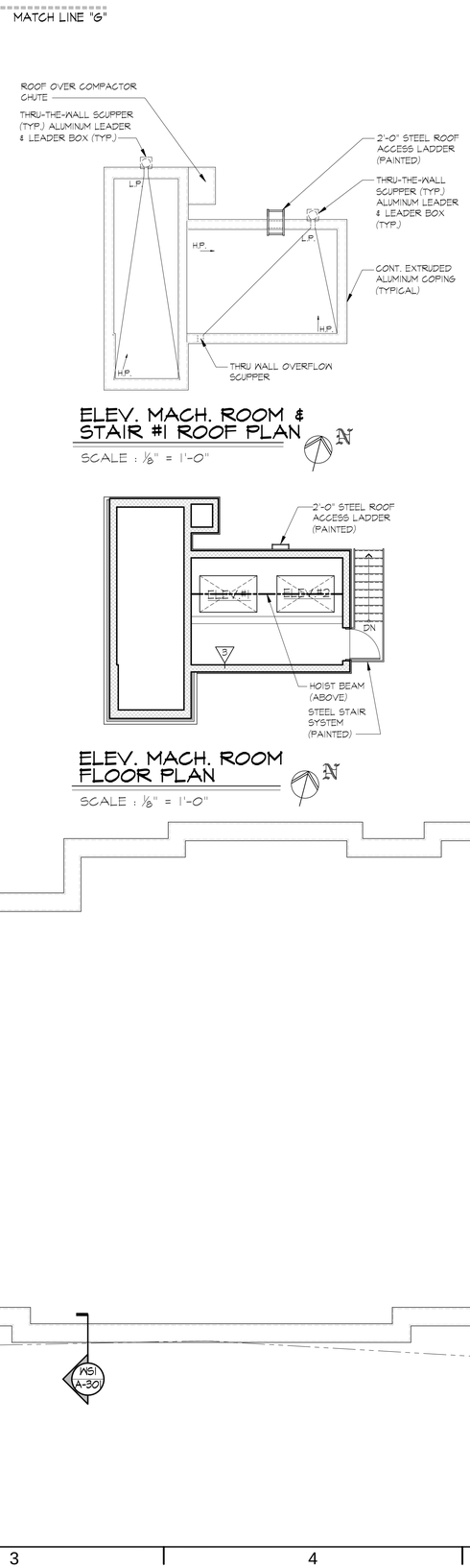
DATE:	XX-XX-XX
PROJECT NO:	0924
DRAWN BY:	AR
CHECKED BY:	
DRAWING NO:	A-111.00
SCALE: AS NOTED	SHEET NO: 15 OF 23
NYC DOB NUMBER:	

0434-A-111



ROOF PLAN

SCALE : 1/8" = 1'-0"

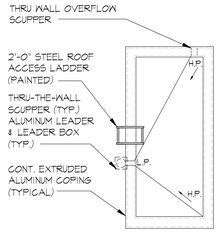


ELEV. MACH. ROOM & STAIR #1 ROOF PLAN

SCALE : 1/8" = 1'-0"

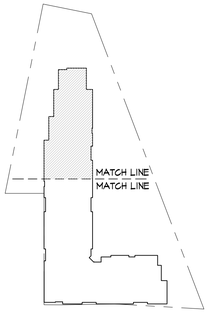
ELEV. MACH. ROOM FLOOR PLAN

SCALE : 1/8" = 1'-0"



ROOF OVER STAIR #2

SCALE : 1/8" = 1'-0"



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09-10-10	ISSUED TO HPD / DACE FOR REVIEW AND COMMENT

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PROPOSED NEW DEVELOPMENT FOR:

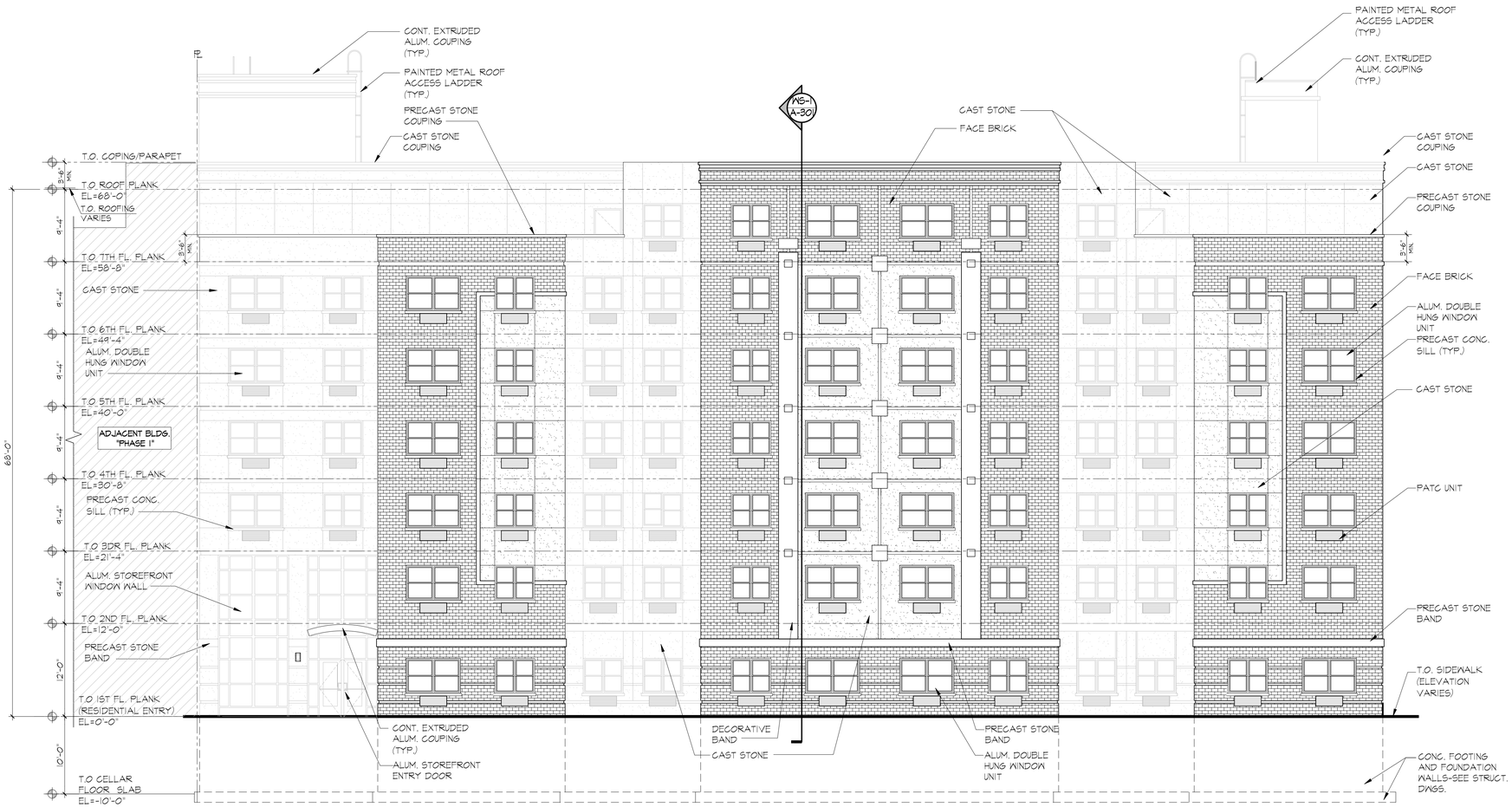
JAMAICA 2

129-09 JAMAICA AVENUE, QUEENS, NEW YORK

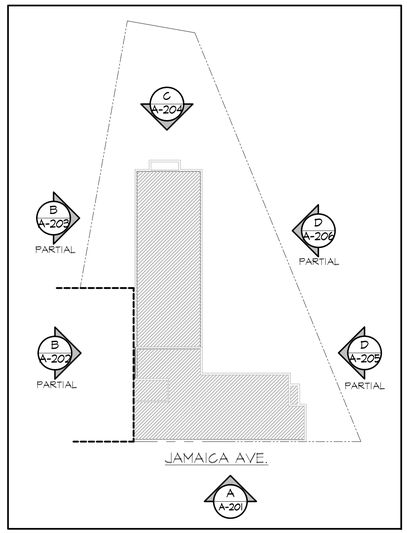
ROOF PLANS

DATE:	XX-XX-XX
PROJECT NO:	0924
DRAWN BY:	AR
CHECKED BY:	
DRAWING NO:	A-112.00
SCALE: AS NOTED	SHEET NO: 16 OF 23
NYC DOB NUMBER:	

0434-A-112



A
A-201
SOUTH ELEVATION
SCALE : 1/8" = 1'-0"



KEY PLAN
NOT TO SCALE

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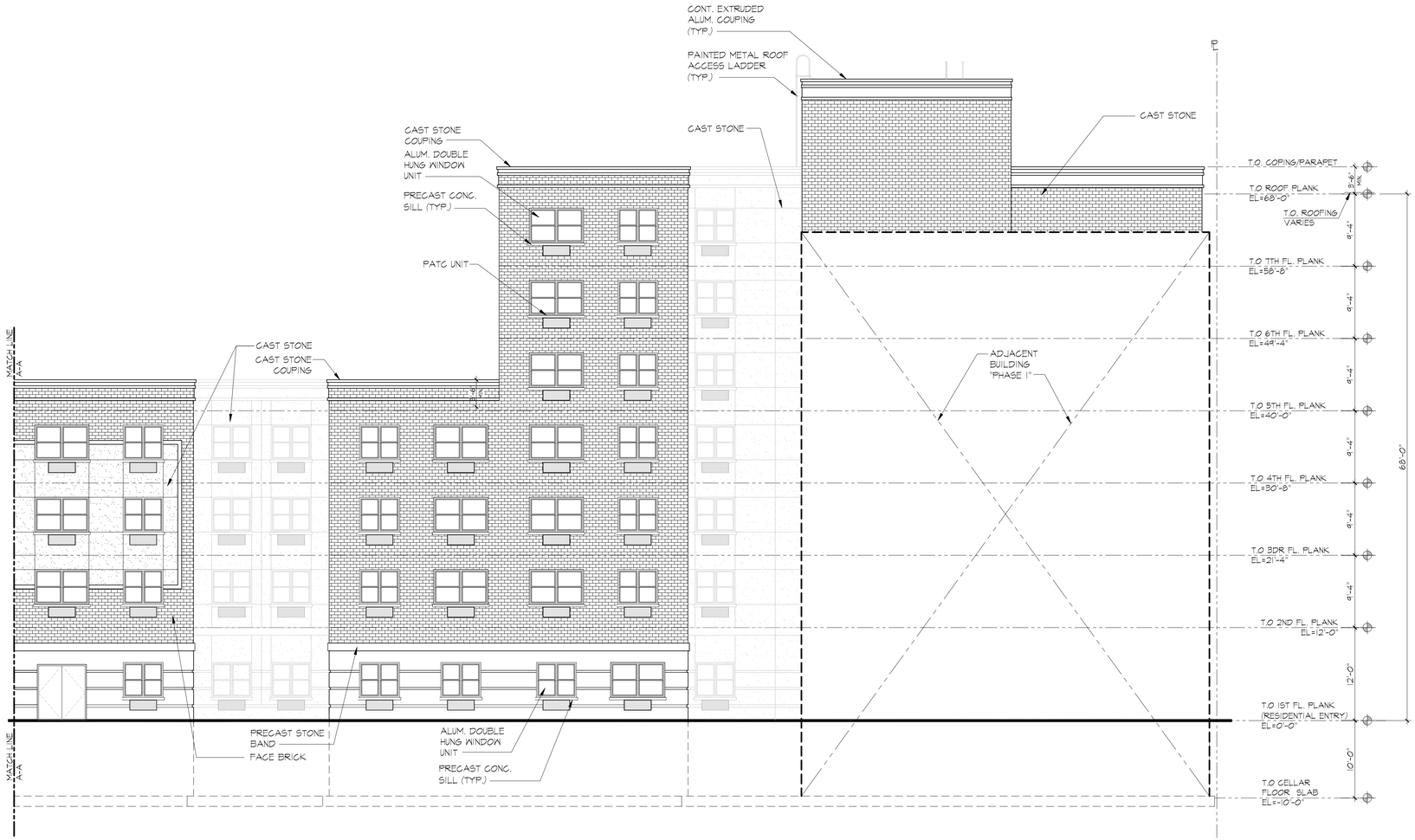
PROPOSED NEW DEVELOPMENT FOR:
JAMAICA 2
129-09 JAMAICA AVENUE, QUEENS, NEW YORK

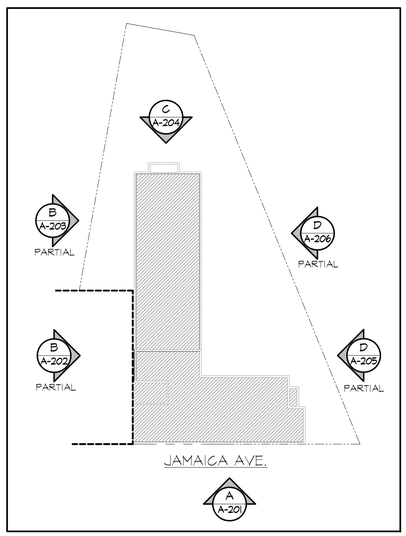
EXTERIOR ELEVATION

DATE:	09-10-10
PROJECT NO:	0924
DRAWN BY:	AR
CHECKED BY:	
DRAWING NO:	A-201.00
SCALE:	AS NOTED SHEET NO: 17 OF 23
NYC DOB NUMBER:	



B A-202 **PARTIAL WEST ELEVATION**

SCALE : 1/8" = 1'-0"



KEY PLAN

NOT TO SCALE

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PROPOSED NEW DEVELOPMENT FOR:

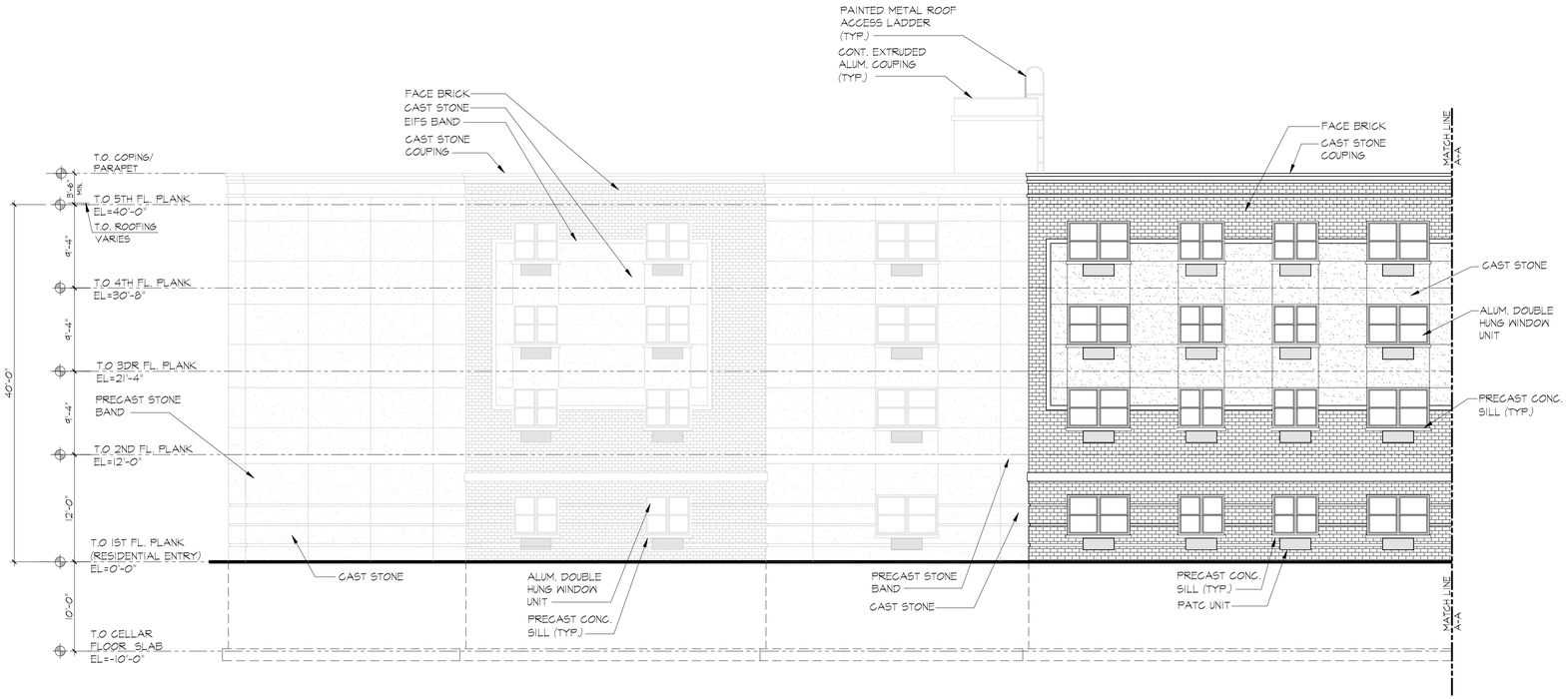
JAMAICA 2

129-09 JAMAICA AVENUE, QUEENS, NEW YORK

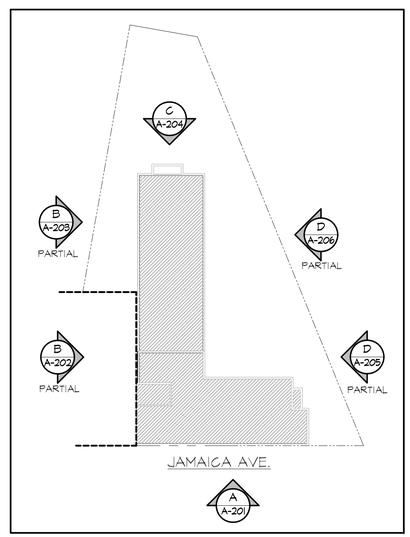
EXTERIOR ELEVATION

DATE:	09-10-10
PROJECT NO:	0924
DRAWN BY:	AR
CHECKED BY:	
DRAWING NO:	A-202.00
SCALE: AS NOTED	SHEET NO: 18 OF 23
NYC DOB NUMBER:	

0924-A-202



B / A-203 **PARTIAL WEST ELEVATION**
SCALE : 1/8" = 1'-0"



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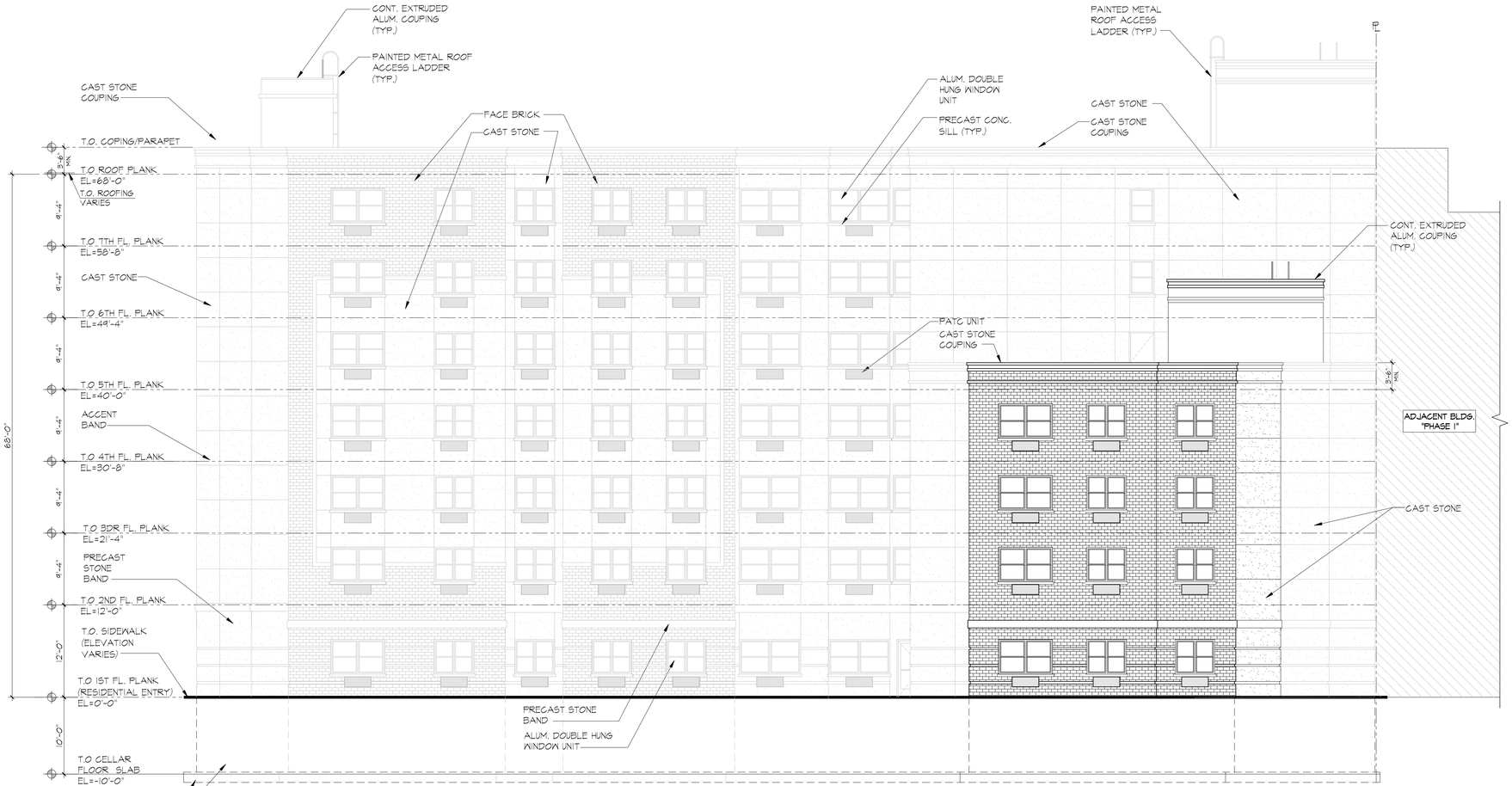
121 WEST 27TH STREET, NEW YORK,NY 10001 TEL: 212-242-5321 FAX: 800-772-8304

PROPOSED NEW MIXED-USE STRUCTURE FOR:
RICHMOND HILL SENIOR LIVING RESIDENCE
129-01 JAMAICA AVENUE , QUEENS, NEW YORK

EXTERIOR ELEVATIONS

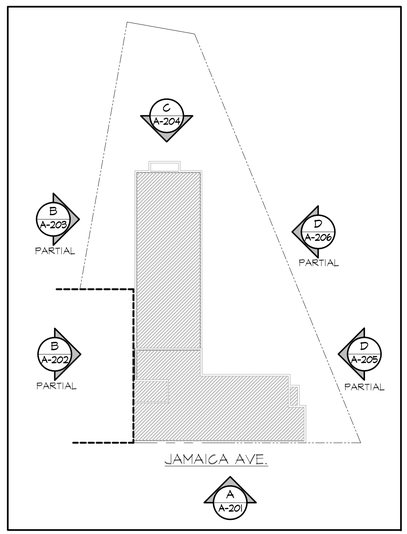
DATE:	09-10-10
PROJECT NO:	0434
DRAWN BY:	MA
CHECKED BY:	EV
DRAWING NO:	A-203.00
SCALE: AS NOTED	SHEET NO: 19 OF 23
NYC DOB NUMBER:	

0434-A-203



C A-204 **NORTH ELEVATION**

SCALE : 1/8" = 1'-0"



KEY PLAN

NOT TO SCALE

N

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PROPOSED NEW MIXED-USE STRUCTURE FOR:

RICHMOND HILL SENIOR LIVING RESIDENCE

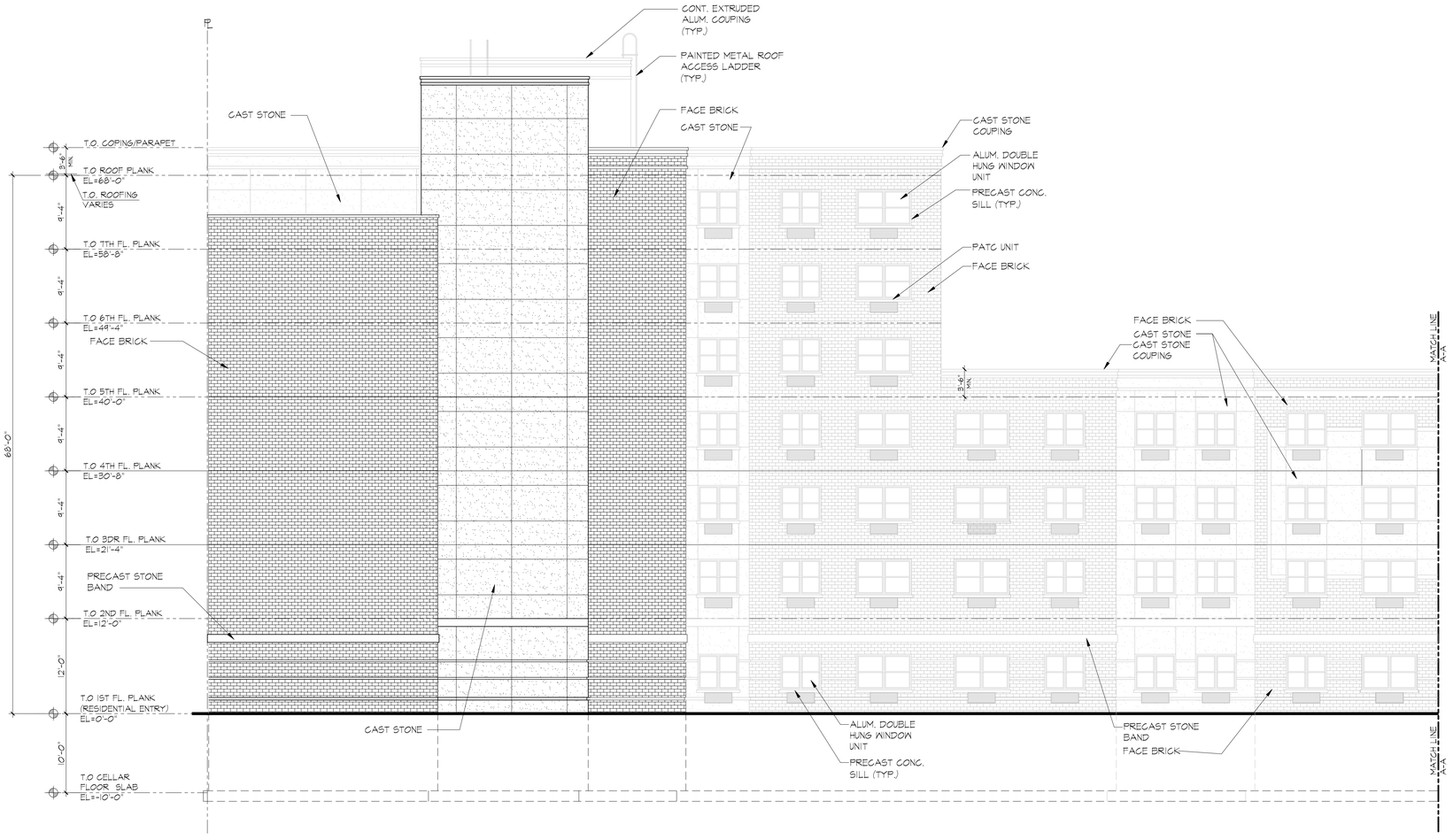
129-01 JAMAICA AVENUE AND 127 STREET, QUEENS, NEW YORK

EXTERIOR ELEVATIONS

DATE:	09-10-10
PROJECT NO:	0434
DRAWN BY:	MA
CHECKED BY:	EV
DRAWING NO:	A-204.00
SCALE: AS NOTED	SHEET NO: 20 OF 23

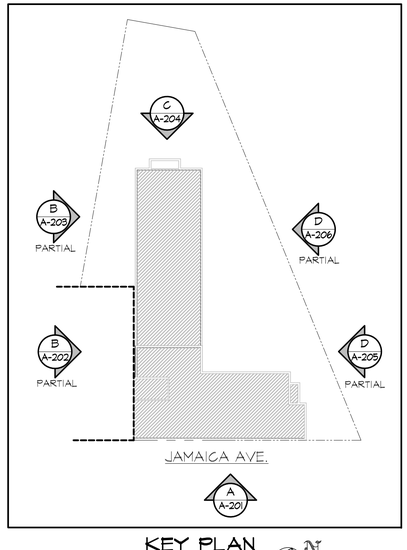
NYC DOB NUMBER:

0434-A-204



D A-205 **PARTIAL EAST ELEVATION**

SCALE : 1/8" = 1'-0"



KEY PLAN

NOT TO SCALE

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PROPOSED NEW MIXED-USE STRUCTURE FOR:

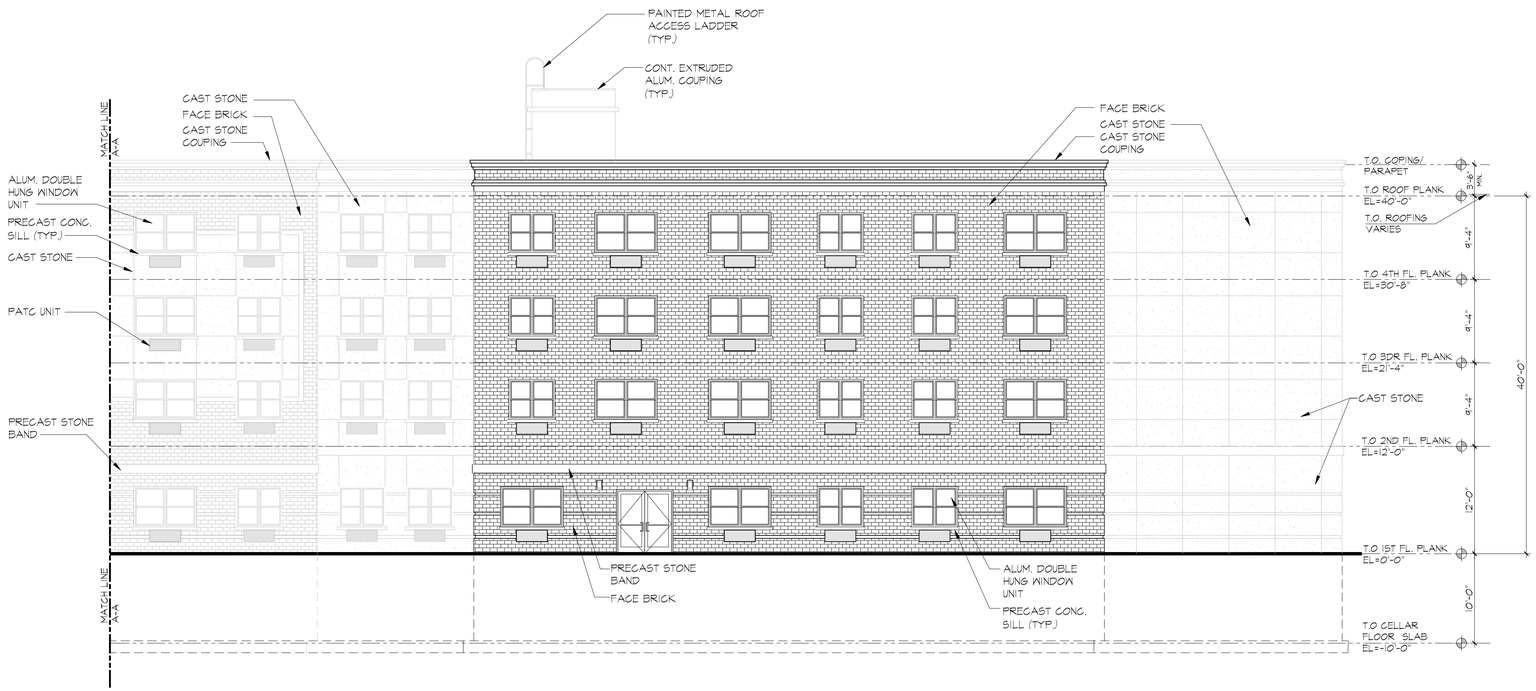
RICHMOND HILL SENIOR LIVING RESIDENCE

129-01 JAMAICA AVENUE AND 127 STREET, QUEENS, NEW YORK

EXTERIOR ELEVATIONS

DATE:	09-10-10
PROJECT NO:	0434
DRAWN BY:	MA
CHECKED BY:	EV
DRAWING NO:	A-205.00
SCALE:	AS NOTED
SHEET NO:	21 OF 23
NYC DOB NUMBER:	

0434-A-205



D / A-206 **PARTIAL EAST ELEVATION**

SCALE : 1/8" = 1'-0"

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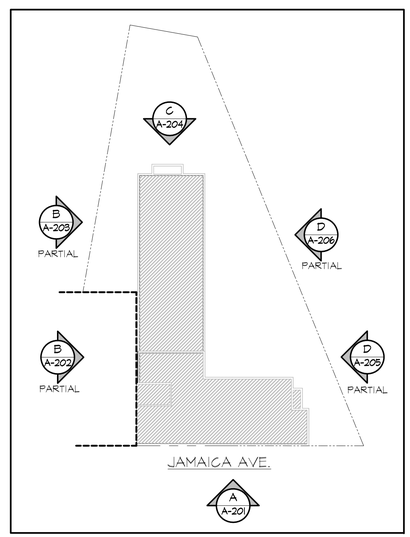

KEY PLAN

NOT TO SCALE

DATE	REVISIONS
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HUGO S. SUBOTOVSKY AIA architects LLC

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PROPOSED NEW MIXED-USE STRUCTURE FOR:

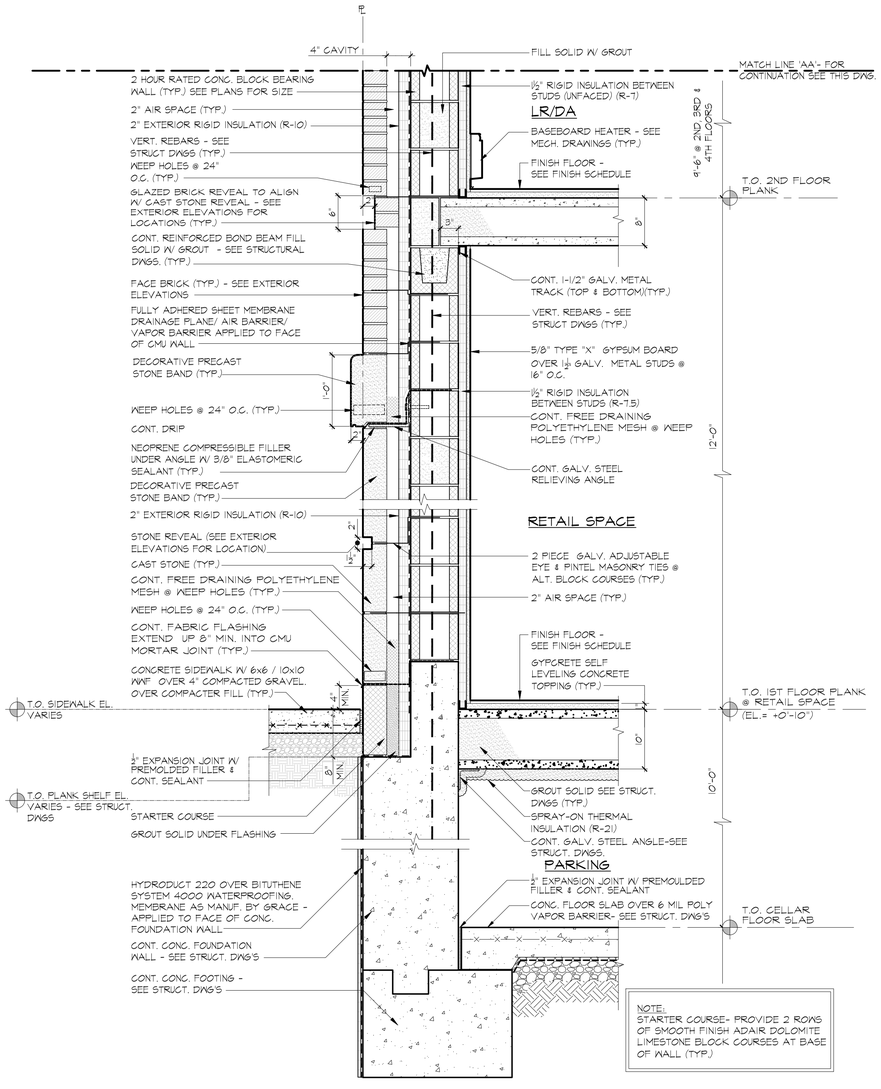
RICHMOND HILL SENIOR LIVING RESIDENCE

129-01 JAMAICA AVENUE AND 127 STREET, QUEENS, NEW YORK

EXTERIOR ELEVATIONS

DATE:	09-10-10
PROJECT NO:	0434
DRAWN BY:	MA
CHECKED BY:	EV
DRAWING NO:	A-206.00
SCALE: AS NOTED	SHEET NO: 22 OF 23
NYC DOB NUMBER:	

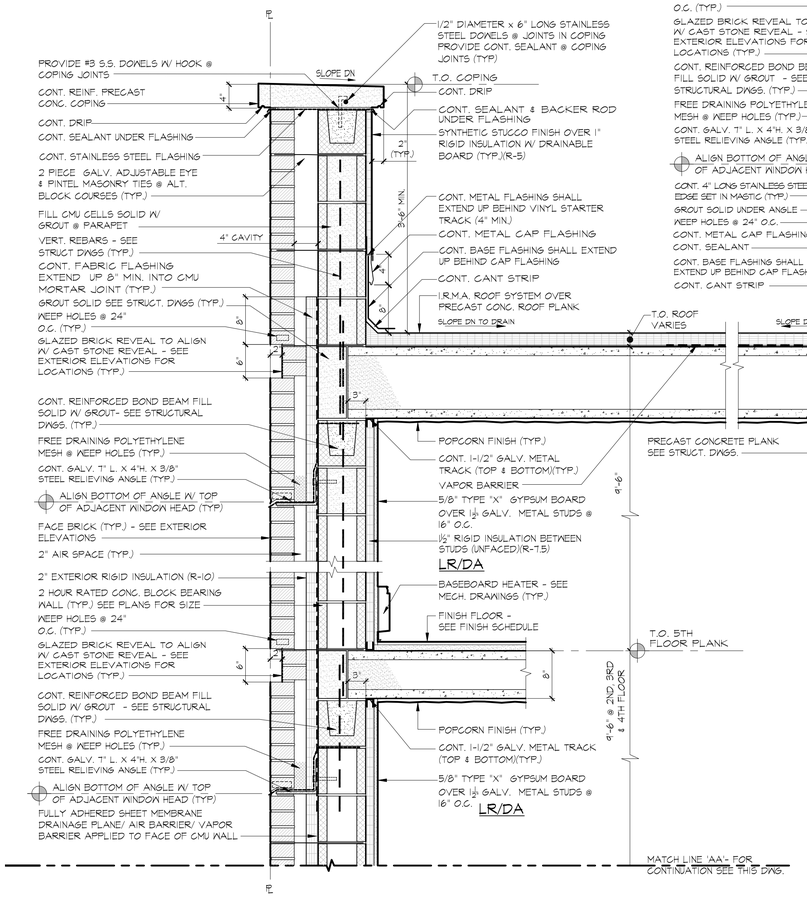
0434-A-206

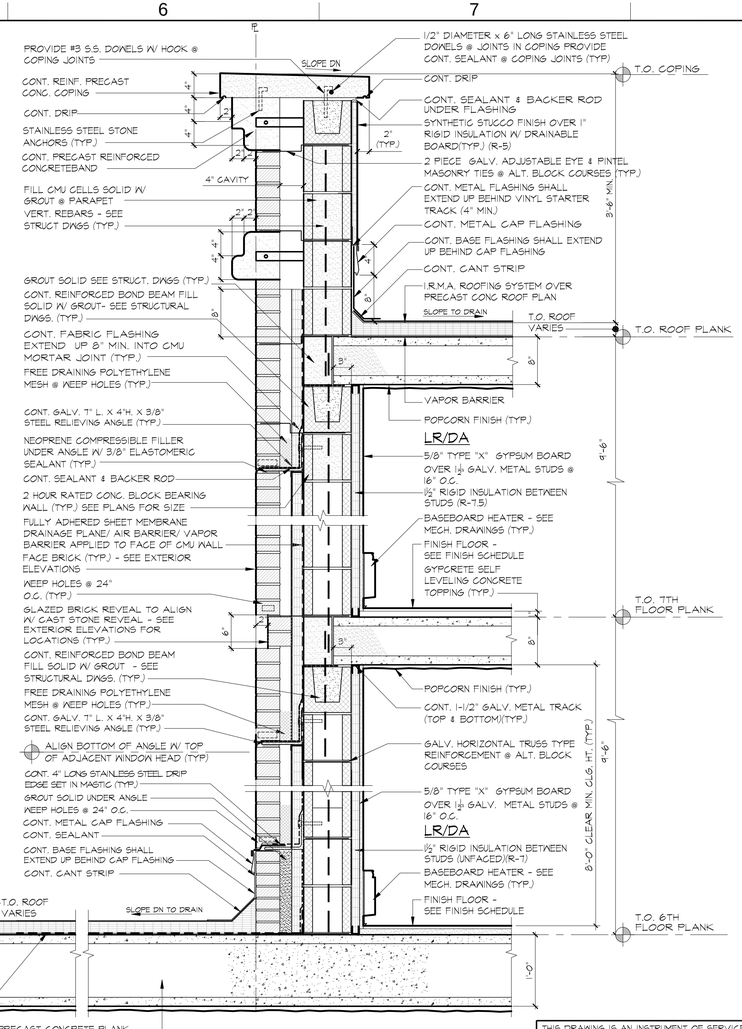


WS-1 **TYPICAL WINDOW WALL SECTION**

SCALE : 1" = 1'-0"

A-101 THRU A-106 & A-201





GENERAL NOTES:

1. G.C. SHALL PROVIDE N.Y. CITY APPROVED CAST STONE & MASONRY VENEER TIES. SUBMIT SHOP DNGS. TO STRUCTURAL ENGINEERS FOR APPROVAL PRIOR TO INSTALLATION (TYP.)
2. WATERPROOFING SYSTEM SHALL BE FURNISHED & INSTALLED PER GEO-TECH ENGINEERS RECOMMENDATIONS.
3. ALL MASONRY TIES SHALL BE HOT DIPPED GALVANIZED (TYP.)
4. FLASHING SHALL EXTEND PAST FACE OF MASONRY 1/4" MIN.

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PROPOSED NEW DEVELOPMENT FOR:

JAMAICA 2

129-09 JAMAICA AVENUE, QUEENS, NEW YORK

TYPICAL WALL SECTION

DATE:	09-10-10
PROJECT NO:	0924
DRAWN BY:	AR
CHECKED BY:	
DRAWING NO:	A-301.00
SCALE: AS NOTED	SHEET NO: 23OF 23
NYC DOB NUMBER:	

0924-A-301

ATTACHMENT B
HEALTH AND SAFETY PLAN

FORMER UNIFORMS FOR INDUSTRY SITE

129-09 JAMAICA AVENUE
RICHMOND HILL, NEW YORK
Block 1948 Lots 30 and 35
Site No. C-241103

HEALTH AND SAFETY PLAN

New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau B-12thFloor
625Broadway
Albany, New York 12233

December 2010

Program Volunteer:
Union Jamaica LLC
15 Verbena Avenue
Suite #100
Floral Park, NY 11001-2711

Prepared By:

ENVIRONMENTAL BUSINESS CONSULTANTS
1808 Middle Country Road
Ridge, NY 11961

HEALTH AND SAFETY PLAN

Site:	**Former Uniforms for Industry Site**
Location:	**129-09 Jamaica Avenue, Richmond Hill, New York**
Prepared By:	**ENVIRONMENTAL BUSINESS CONSULTANTS**
Date Prepared:	**DECEMBER - 2010**
Version:	**1**
Revision:	**0**
Project Description:	**REMEDIAL ACTION WORK PLAN**
Waste types:	Solid, Liquid
Characteristics:	Volatile Organic Compounds – Gasoline related hydrocarbons Volatile Organic Compounds – Chlorinated Hydrocarbons Semi-Volatile Organic Compounds – Varsol, mineral spirits Metals – Lead
Overall Hazard:	Low to Moderate

ENVIRONMENTAL BUSINESS CONSULTANTS (EBC) AND EBC'S SUBCONTRACTORS DO NOT GUARANTEE THE HEALTH OR SAFETY OF ANY PERSON ENTERING THIS SITE. DUE TO THE NATURE OF THIS SITE AND THE ACTIVITY OCCURRING THEREON, IT IS NOT POSSIBLE TO DISCOVER, EVALUATE, AND PROVIDE PROTECTION FOR ALL POSSIBLE HAZARDS WHICH MAY BE ENCOUNTERED. STRICT ADHERENCE TO THE HEALTH AND SAFETY GUIDELINES SET FORTH HEREIN WILL REDUCE, BUT NOT ELIMINATE, THE POTENTIAL FOR INJURY AT THIS SITE. THE HEALTH AND SAFETY GUIDELINES IN THIS PLAN WERE PREPARED SPECIFICALLY FOR THIS SITE AND SHOULD NOT BE USED ON ANY OTHER SITE WITHOUT PRIOR RESEARCH AND EVALUATION.

HEALTH AND SAFETY PLAN
Table of Contents

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY11961
Phone 631.604.4000
Fax 631.924.2870

Table of Contents (Continued)

FIGURES

APPENDICES

EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
1808 MIDDLE COUNTRY ROAD
RIDGE, NY11961
PHONE 631.604.4000
FAX 631.924.2870

STATEMENT OF COMMITMENT

This Health and Safety Plan (HASP) has been prepared to ensure that workers are not exposed to risks from hazardous materials during the Remedial Action planned for 129-09 Jamaica Avenue, Richmond Hill, New York.

This HASP, which applies to persons present at the site actually or potentially exposed to hazardous materials, describes emergency response procedures for actual and potential chemical hazards. This HASP is also intended to inform and guide personnel entering the work area or exclusion zone. Persons are to acknowledge that they understand the potential hazards and the contents of this Health and Safety policy by signing off on receipt of their individual copy of the document. Contractors and suppliers are retained as independent contractors and are responsible for ensuring the health and safety of their own employees.

1.0 INTRODUCTION

This document describes the health and safety guidelines developed by Environmental Business Consultants (EBC) for implementation of Remedial Action at the site located 129-09 Jamaica Avenue, Richmond Hill, NY, to protect on-site personnel, visitors, and the public from physical harm and exposure to hazardous materials or wastes during subsurface investigation activities. In accordance with the Occupational Safety and Health Administration (OSHA) 29 CFR Part 1910.120 Hazardous Waste Operations and Emergency Response Final rule, this HASP, including the attachments, addresses safety and health hazards related to subsurface sample collection activities and is based on the best information available. The HASP may be revised by EBC at the request of The Arker Companies, ("the owner") and/or the New York State Department of Environmental Conservation (NYSDEC) or New York State Department of Health (NYSDOH) upon receipt of new information regarding site conditions. Changes will be documented by written amendments signed by EBC's project manager, site safety officer and/or the EBC health and safety consultant.

1.1 Scope

This HASP addresses the potential hazards related to the site Remedial Action (RA). The RA activities include three distinct stages as described below:

1) Site mobilization of Demolition Subcontractor (DS);
   a) Demolition, removal and disposal of former Uniforms for Industry buildings
   b) Site demobilization of DS

2) Site mobilization of 40HR HAZWOPER trained Environmental Remediation Subcontractor (EnvRS).
   a) Excavate, load and transport for disposal, soil contaminated with chlorinated hydrocarbons by EnvRS. Areas that require handling by ERS only, and requires excavation and disposal prior to site access by general site workers are fully described within Remedial Action Plan.
   b) Expose, remove and remediate onsite drywells and overflow pools.
   c) Demobilization of EnvRS

3) Site mobilization of General Subcontractor for excavation of non-chlorinated hydrocarbon impacted soil for construction of buildings' foundations.

4) Application of liquid sodium persulfate solution.

1.2 Application

The HASP applies to all personnel involved in the above tasks who wish to gain access to active work areas, including but not limited to:

- EBC employees and subcontractors;
- Client representatives; and
- Federal, state or local representatives.

1.3 Site Safety Plan Acceptance, Acknowledgment and Amendments

The project superintendent and the site safety officer are responsible for informing personnel

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

(EBC employees and/or owner or owners representatives) entering the work area of the contents of this plan and ensuring that each person signs the safety plan acknowledging the on-site hazards and procedures required to minimize exposure to adverse effects of these hazards. A copy of the Acknowledgement Form is included in **Appendix A**.

Site conditions may warrant an amendment to the HASP. Amendments to the HASP are acknowledged by completing forms included in **Appendix B**.

1.4 Key Personnel - Roles and Responsibilities

Personnel responsible for implementing this Construction Health and Safety Plan are:

Name	Title	Address	Contact Numbers
Mr. Charles B. Sosik	EBC Principal	1808 Middle Country Road Ridge, NY 11961	(631) 504-6000 Cell (631) 357-4927
Mr. Richard Powers	The Arker Companies Construction Supervisor	930 Broadway Woodmere, NY 11598	(516) 374-3336 Cell (516) 250-5343
Mr. Kevin Brussee	EBC Project Manager	1808 Middle Country Road Ridge, NY 11961	(631) 504-6000 Cell (631) 338-1749
Mr. Kevin Waters	EBC Site Safety Officer	1808 Middle Country Road Ridge, NY 11961	(631) 504-6000

The project manager is responsible for overall project administration and, with guidance from the site safety officer, for supervising the implementation of this HASP. The site safety officer will conduct daily (tail gate or tool box) safety meetings at the project site and oversee daily safety issues. Each subcontractor and supplier (defined as an OSHA employer) is also responsible for the health and safety of its employees. If there is any dispute about health and safety or project activities, on-site personnel will attempt to resolve the issue. If the issue cannot be resolved at the site, then the project manager will be consulted.

The site safety officer is also responsible for coordinating health and safety activities related to hazardous material exposure on-site. The site safety officer is responsible for the following:

1. Educating personnel about information in this HASP and other safety requirements to be observed during site operations, including, but not limited to, decontamination procedures, designation of work zones and levels of protection, air monitoring, fit testing, and emergency procedures dealing with fire and first aid.

2. Coordinating site safety decisions with the project manager.

3. Designating exclusion, decontamination and support zones on a daily basis.

4. Monitoring the condition and status of known on-site hazards and maintaining and implementing the air quality monitoring program specified in this HASP.

5. Maintaining the work zone entry/exit log and site entry/exit log.

6. Maintaining records of safety problems, corrective measures and documentation of chemical exposures or physical injuries (the site safety officer will document these conditions in a bound notebook and maintain a copy of the notebook on-site).

The person who observes safety concerns and potential hazards that have not been addressed in the daily safety meetings should immediately report their observations/concerns to the site safety officer or appropriate key personnel.

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2.0 SITE BACKGROUND AND SCOPE OF WORK

The Site is located in the County of the Queens, New York and is identified as Block 9281, and Lot 44 on the Queens Borough Tax Map. The Site is situated on an approximately 73,038 square foot (1.68-acre) area bounded by residential properties and 127th Street to the west, a residential lot to the north, Jamaica Avenue to the south and the Long Island Railroad-Ronkonkoma Line to the east. The Site is improved with a one story masonry building constructed in 1929 with a large 2 story masonry addition constructed in the 1990's. The combined area of the building and addition totals 55,626 sq. ft. The buildings have been vacant since November 2002 when Uniforms for Industry (UFI), a commercial laundry operation, vacated the premises. UFI has owned the property and operated its commercial laundry at the Site since the 1950's. Prior to UFI's occupancy, the Ideal Vortex Laundry Company operated a commercial laundry on the property from the 1929 to 1957.

Previous environmental reports indicate that fuel oil, mop oil, mineral spirits, Stoddard solvent, and Varsol solvent have been historically stored on the Site. According to the Remedial Investigation Report prepared by Environmental Liability Management, LLC (12/09) UFI used tetrachloroethene (PCE) in a dry cleaning machine from 1992 and 1997.

According to the NYSDEC Spills Database, two spill numbers are associated with the Site. Spill No. 91-01477, which was reported on May 6, 1991, was related to the tank test failure of a 3,000 gallon underground storage tank. The database indicates that the spill was closed on March 7, 2003 as a result of no new information. The spill file references a second spill, No. 02-08119. The second spill is related to a tank test failure of a 6,000 gallon fuel oil tank. Upon further investigation under this spill no. contaminated soil was discovered around the fill lines of a mineral oil tank and a diesel tank. This spill remains open.

The property is identified in the NYSDEC Petroleum Bulk Storage database as Facility Site No. 2-248541. The facility status is listed as unregulated. The database lists thirteen tanks registered under Uniforms for Industry. The tanks listed include: two 6,300 gallon underground storage tank (UST) (one fuel oil, one "other"), one 7,500 gallon UST (fuel oil), three 2,000 gallon UST ("other"), three 3,000 gallon USTs (2 "other", 1 "invalid material"), one 6,000 gallon UST ("empty") and three 1,500 gallon USTs ("empty"). Eleven of the thirteen tanks are listed as closed removed. Two of the 3,000 gallon tanks are listed as "closed prior to 3/1991".

2.1 Redevelopment Plans

A residential use is proposed for the property. The Site will be redeveloped through the construction of two new apartment buildings which are identified in the Architectural Plans as Phase I and Phase II. The Phase I component is a 6-story, 65 unit senior housing building which will be built in the western portion of the site at the intersection of Jamaica Avenue and 127th Street. The entire 12,090 sq. ft area (footprint) of this building will have a full depth (10ft) cellar level. The cellar will be used for tenant storage cubicles, bicycle storage, a laundry room a trash compactor room and mechanical/meter rooms. The exterior grounds will feature a surface parking lot, recreation area and landscaped area.

The Phase II component includes a 7-story building with 117 units set aside for low-income housing. A full depth (10 ft) cellar level will extend beneath the entire 21,302 sq. ft area

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(footprint) of the building. The cellar level will be used for parking (35 spaces), bicycle storage and mechanical/meter rooms. The exterior grounds around the Phase II building will include parking for 35 cars, access ramps for the cellar level parking garage and landscaped areas.

2.2 Description of Remedial Action

Site activities included within the Remedial Action that are included within the scope of this HASP include the following:

1. Excavation of the upper 15 to 20 feet of soil in three identified CVOC hot Spot areas with additional excavation as required for the building's basement level.
2. Excavate any additional petroleum VOC or CVOC impacted soil encountered in the hot spot areas above restricted residential criteria in the upper 15 feet of the soil column. Petroleum VOC or CVOC affected soil encountered during excavation of the basement areas will be segregated and classified for off-site disposal.
3. Excavation and off-site disposal of historic fill materials removed during construction / site grading or if present in planned landscaped/exposed soil areas.
4. Screening for indications of contamination (by visual means, odor, and monitoring with PID) of all excavated soil during all intrusive Site work.
5. Site Monitoring of airborne VOCs and particulates in accordance with a NYSDEC and NYSDOH approved Community Air Monitoring Plan (CAMP) and Health and Safety Plan during all intrusive and soil handling activities.
6. Implementation of proper dust and odor suppression techniques during all intrusive and soil handling activities.
7. Import of materials to be used for backfill and cover.
8. Collection of end-point soil samples.
9. Investigation and removal of drainage structures, surface drains and related piping.
10. The injection of a chemical oxidant solution to remediate the contaminated groundwater beneath the site. Chemical oxidants will be injected through pvc injection points installed into the water table.
11. Installation of a vapor barrier and sub-slab depressurization system beneath all basement areas which will not be required to have continuous mechanical ventilation.

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3.0 HAZARD ASSESSMENT

This section identifies the hazards associated with the proposed scope of work, general physical hazards that can be expected at most sites; and presents a summary of documented or potential chemical hazards at the site. Every effort must be made to reduce or eliminate these hazards. Those that cannot be eliminated must be guarded against using engineering controls and/or personal protective equipment.

3.1 Physical Hazards

3.1.1 Tripping Hazards

An area of risk associated with on-site activities are presented by uneven ground, concrete, curbstones or equipment which may be present at the site thereby creating a potential tripping hazard. During intrusive work, care should be taken to mark or remove any obstacles within the exclusion zone.

3.1.2 Climbing Hazards

During site activities, workers may have to work on excavating equipment by climbing. The excavating contractor will conform with any applicable NIOSH and OSHA requirements or climbing activities.

3.1.3 Cuts and Lacerations

Field activities that involve excavating activities usually involve contact with various types of machinery. A first aid kit approved by the American Red Cross will be available during all intrusive activities.

3.1.4 Lifting Hazards

Improper lifting by workers is one of the leading causes of industrial injuries. Field workers in the excavation program may be required to lift heavy objects. Therefore, all members of the field crew should be trained in the proper methods of lifting heavy objects. All workers should be cautioned against lifting objects too heavy for one person.

3.1.5 Utility Hazards

Before conducting any excavation, the excavation contractor will be responsible for locating and verifying all existing utilities at each excavation.

3.1.6 Traffic Hazards

All traffic, vehicular and pedestrian, shall be maintained and protected at all times consistent with local, state and federal agency regulations regarding such traffic and in accordance with NYCDOT guidelines. The excavation contractor shall carry on his operations without undue interference or delays to traffic. The excavation contractor shall furnish all labor, materials, guards, barricades, signs, lights, and anything else necessary to maintain traffic and to protect his work and the public, during operations.

3.2 Work in Extreme Temperatures

Work under extremely hot or cold weather conditions requires special protocols to minimize the chance that employees will be affected by heat or cold stress.

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3.2.1 Heat Stress

The combination of high ambient temperature, high humidity, physical exertion, and personal protective apparel, which limits the dissipation of body heat and moisture, can cause heat stress.

The following prevention, recognition and treatment strategies will be implemented to protect personnel from heat stress. Personnel will be trained to recognize the symptoms of heat stress and to apply the appropriate treatment.

1. Prevention
    a. Provide plenty of fluids. Available in the support zone will be a 50% solution of fruit punch and water or plain water.
    b. Work in Pairs. Individuals should avoid undertaking any activity alone.
    c. Provide cooling devices. A spray hose and a source of water will be provided to reduce body temperature, cool protective clothing and/or act as a quick-drench shower in case of an exposure incident.
    d. Adjustment of the work schedule. As is practical, the most labor-intensive tasks should be carried out during the coolest part of the day.

2. Recognition and Treatment
    a Heat Rash (or prickly heat):
        Cause: Continuous exposure to hot and humid air, aggravated by chafing clothing.
        Symptoms: Eruption of red pimples around sweat ducts accompanied by intense itching and tingling.
        Treatment: Remove source or irritation and cool skin with water or wet cloths.

    b. Heat Cramps (or heat prostration)
        Cause: Profuse perspiration accompanied by inadequate replenishment of body water and electrolytes.
        Symptoms: Muscular weakness, staggering gait, nausea, dizziness, shallow breathing, pale and clammy skin, approximately normal body temperature.
        Treatment: Perform the following while making arrangement for transport to a medical facility. Remove the worker to a contamination reduction zone. Remove protective clothing. Lie worker down on back in a cool place and raise feet 6 to 12 inches. Keep warm, but loosen all clothing. If conscious, provide sips of salt-water solution, using one teaspoon of salt in 12 ounces of water. Transport to a medical facility.
    c. Heat Stroke
        Cause: Same as heat exhaustion. This is also an extremely serious condition.
        Symptoms: Dry hot skin, dry mouth, dizziness, nausea, headache, rapid pulse.
        Treatment: Cool worker immediately by immersing or spraying with cool water or sponge bare skin after removing protective clothing. Transport to hospital.

3.2.2 Cold Exposure

Exposure to cold weather, wet conditions and extreme wind-chill factors may result in excessive

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loss of body heat (hypothermia) and /or frostbite. To guard against cold exposure and to prevent cold injuries, appropriate warm clothing should be worn, warm shelter must be readily available, rest periods should be adjusted as needed, and the physical conditions of on-site field personnel should be closely monitored. Personnel and supervisors working on-site will be made aware of the signs and symptoms of frost bite and hypothermia such as shivering, reduced blood pressure, reduced coordination, drowsiness, impaired judgment, fatigue, pupils dilated but reactive to light and numbing of the toes and fingers.

3.3 Chemical Hazards

Soil, groundwater and soil gas samples collected from the site as part of several subsurface investigations performed at the site have revealed significant concentrations of volatile organic compounds associated with both petroleum volatile organic compounds (PVOCs) and chlorinated organic compounds (CVOCs), as well as elevated levels of semi-volatile organic compounds (SVOCs) and metals.

Volatile organic compounds reported to be present in soil, soil gas and/or groundwater include the following:

Benzene	Toluene	Ethylbenzene	Xylenes
1,2,4-Trimethylbenzene	Cis-Dichloroethylene	Isopropylbenzene	n-Butylbenzene
1,3,5-Trimethylbenzene	p-Isopropyltoluene	n-Propylbenzene	Acetone
cis-1,2-Dichloroethene	2,2-Dichloropropane	sec-Butylbenzene	Napthalene
Trichloroethene (TCE)	1,1,1-Trichloroethane	tert-Butylbenzene	Vinyl Chloride
Tetrachloroethylene (PCE)			

Semi-Volatile organic compounds reported to be present soil, soil gas and/or groundwater include the following:

Benzo(a)anthracene	Phenanthrene	Benzo(b)fluoranthene	Acenaphthylene
Benzo(g,h,i)perylene	Pyrene	Indeno(1,2,3-cd)pyrene	Benzo(a)pyrene
Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	
Dibenzo(a,h)anthracene	Fluoranthene	Bis(2-ethylhexyl)phthalate	

Metals reported to be present soil, and/or groundwater include the following

Chromium	Copper	Lead	Nickel
Selenium	Zinc	Barium	Arsenic

The VOCs and SVOCs detected within the soil, soil gas and/or groundwater are associated with the former drycleaning operations conducted at the site. Chlorinated solvents such as PCE were utilized in the 1990's within a dry cleaning machine, and petroleum based VOCs and SVOCs were utilized in #2 and #6 heating oil, mop oil, and mineral spirits contained in underground storage tanks at the site.

Chlorinated hydrocarbon (PCE, TCE, DCE, vinyl chloride) contamination of groundwater has been determined to be site wide. However, very few of the soil samples collected from the site contained these chlorinated compounds. The areas of affected soil based upon previous studies are limited to several hotspot source areas that will be targeted for excavation. These hot spot areas are located near the former central UST area and at the east parking lot drainage system

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distribution box and line repair area.

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PVOC contamination of soil corresponds with several of the CVOC hotspot areas, but maybe encountered in additional areas as well. SVOC contaminated areas include the former underground storage tank farm area on the eastern side of the UFI building, as well as historic fill that may be encountered in shallow areas at the site (approximately 6" to 2 feet).

The primary routes of exposure to identified contaminants in soil, soil gas and groundwater to on-site investigation and remediation workers is through inhalation, ingestion and absorption.

Appendix C includes information sheets for the known and suspected chemicals that may be encountered at the site.

3.3.1 Respirable Dust

Dust may be generated from vehicular traffic and/or excavation activities. If visible observation detects elevated levels of dust, a program of wetting will be employed by the site safety officer. If elevated dust levels persist, the site safety office will employ dust monitoring using a particulate monitor (Miniram or equivalent). If monitoring detects concentrations greater than 150 µg/m3 over daily background, the site safety officer will take corrective actions as defined herein, including the use of water for dust suppression and if this is not effective, requiring workers to wear APRs with efficiency particulate air (HEPA) cartridges.

Absorption pathways for dust and direct contact with soils or groundwater will be mitigated with the implementation of latex gloves, hand washing and decontamination exercises when necessary.

3.3.2 Dust Control and Monitoring During Earthwork

Dust generated during excavation activities or other earthwork may contain contaminants identified in soils at the site. Dust will be controlled by wetting the working surface with water. Calcium chloride may be used if the problem cannot be controlled with water. Air monitoring and dust control techniques are specified in a site specific Dust Control Plan (if applicable). Site workers will not be required to wear APR's unless dust concentrations are consistently over 150 µg/m3 over site-specific background in the breathing zone as measured by a dust monitor unless the site safety officer directs workers to wear APRs. The site safety officer will use visible dust as an indicator to implement the dust control plan.

3.3.3 Organic Vapors

Elevated levels of VOCs were detected in both soil and groundwater samples collected during previous investigations at the site. Therefore, excavation activities may cause the release of organic vapors to the atmosphere. The site safety officer will periodically monitor organic vapors with a Photoionization Detector (PID) during excavation activities to determine whether organic vapor concentrations exceed action levels shown in Section 5 and/or the Community Air Monitoring Plan.

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4.0 PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment (PPE) shall be selected in accordance with the site air monitoring program, OSHA 29 CFR 1910.120(c), (g), and 1910.132. Protective equipment shall be NIOSH approved and respiratory protection shall conform to OSHA 29 CFR Part 1910.133 and 1910.134 specifications; head protection shall conform to 1910.135; eye and face protection shall conform to 1910.133; and foot protection shall conform to 1910.136. The only true difference among the levels of protection from D thru B is the addition of the type of respiratory protection. **It is anticipated that work will be performed in Level D PPE.**

4.1 Level D

Level D PPE shall be donned when the atmosphere contains no known hazards and work functions preclude splashes, immersion, or the potential for inhalation of, or contact with, hazardous concentrations of harmful chemicals. Level D PPE consists of:

- standard work clothes, coveralls, or tyvek, as needed;
- steel toe and steel shank work boots;
- hard hat;
- gloves, as needed;
- safety glasses;
- hearing protection;
- equipment replacements are available as needed.

4.2 Level C

Level C PPE shall be donned when sustained concentrations of measured total organic vapors in the breathing zone exceed background concentrations (using a portable OVA, or equivalent), by more than 5 ppm. The specifications on the APR filters used must be appropriate for contaminants identified or expected to be encountered. Level C PPE shall be donned when the identified contaminants have adequate warning properties and criteria for using APR have been met. Level C PPE consists of:

- chemical resistant or coated tyvek coveralls;
- steel-toe and steel-shank workboots;
- chemical resistant overboots or disposable boot covers;
- disposable inner gloves (surgical gloves);
- disposable outer gloves;
- full face APR fitted with organic vapor/dust and mist filters or filters appropriate for the identified or expected contaminants;
- hard hat;
- splash shield, as needed; and,
- ankles/wrists taped with duct tape.

The site safety officer will verify if Level C is appropriate by checking organic vapor concentrations using compound and/or class-specific detector tubes.

The exact PPE ensemble is decided on a site-by-site basis by the Site Safety Officer with the intent to provide the most protective and efficient worker PPE.

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4.3 Activity-Specific Levels of Personal Protection

The required level of PPE is activity-specific and is based on air monitoring results (Section 4.0) and properties of identified or expected contaminants. **It is expected that site work will be performed in Level D.** If air monitoring results indicate the necessity to upgrade the level of protection, engineering controls (i.e. Facing equipment away from the wind and placing site personnel upwind of excavations, active venting, etc.) will be implemented before requiring the use of respiratory protection.

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5.0 AIR MONITORING AND ACTION LEVELS

29 CFR 1910.120(h) specifies that monitoring shall be performed where there may be a question of employee exposure to hazardous concentrations of hazardous substances in order to assure proper selection of engineering controls, work practices and personal protective equipment so that employees are not exposed to levels which exceed permissible exposure limits, or published exposure levels if there are no permissible exposure limits, for hazardous substances.

5.1 Air Monitoring Requirements

If excavation work is performed, air will be monitored for VOCs with a portable ION Science 3000EX photoionization detector, or the equivalent. If necessary, Lower Explosive Limit (LEL) and oxygen will be monitored with a Combustible Gas Indicator (CGI). If appropriate, fugitive dust will be monitored using a MiniRam Model PDM-3 aerosol monitor. Air will be monitored when any of the following conditions apply:

- initial site entry;
- during any work where a potential IDLH condition or flammable atmosphere could develop;
- excavation work begins on another portion of the site;
- contaminants, other than those previously identified, have been discovered;
- each time a different task or activity is initiated;
- during trenching and/or excavation work.

The designated site safety officer will record air monitoring data and ensure that air monitoring instruments are calibrated and maintained in accordance with manufacturer's specifications. Instruments will be zeroed daily and checked for accuracy. Monitoring results will be recorded in a field notebook and will be transferred to instrument reading logs.

5.2 Work Stoppage Responses

The following responses will be initiated whenever one or more of the action levels necessitating a work stoppage are exceeded:

1 The SSO will be consulted immediately
2 All personnel (except as necessary for continued monitoring and contaminant migration, if applicable) will be cleared from the work area (eg from the exclusion zone).
3 Monitoring will be continued until intrusive work resumes.

5.3 Action Levels During Excavation Activities

Instrument readings will be taken in the breathing zone above the excavation pit unless otherwise noted. Each action level is independent of all other action levels in determining responses.

Organic Vapors (PID)	LEL %	Responses
0-1 ppm above background	0%	• Continue excavating • Level D protection • Continue monitoring every 10 minutes
1-5 ppm Above Background, Sustained Reading	1-10%	• Continue excavating • Go to Level C protection or employ

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		engineering controls • Continue monitoring every 10 minutes
5-25 ppm Above Background, Sustaineed Reading	10-20%	• Discontinue excavating, unless PID is only action level exceeded. • Level C protection or employ engineering controls • Continue monitoring for organic vapors 200 ft downwind • Continuous monitoring for LEL at excavation pit
>25 ppm Above Background, Sustained Reading	>20%	• Discontinue excavating • Withdraw from area, shut off all engine ignition sources. • Allow pit to vent • Continuous monitoring for organic vapors 200 ft downwind.

Notes: Air monitoring will occur in the breathing zone 30 inches above the excavation pit. Readings may also be taken in the excavation pit but will not be used for action levels.

If action levels for any one of the monitoring parameters are exceeded, the appropriate responses listed in the right hand column should be taken. If instrument readings do not return to acceptable levels after the excavation pit has been vented for a period of greater than one-half hour, a decision will then be made whether or not to seal the pit with suppressant foam.

If, during excavation activities, downwind monitoring PID readings are greater than 5 ppm above background for more than one-half hour, excavation will stop until sustained levels are less then 5 ppm (see Community Air Monitoring Plan).

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6.0 SITE CONTROL

6.1 Work Zones

The primary purpose of site controls is to establish the perimeter of a hazardous area, to reduce the migration of contaminants into clean areas, and to prevent access or exposure to hazardous materials by unauthorized persons. When operations are to take place involving hazardous materials, the site safety officer will establish an exclusion zone, a decontamination zone, and a support zone. These zones "float" (move around the site) depending on the tasks being performed on any given day. The site safety officer will outline these locations before work begins and when zones change. The site safety officer records this information in the site log book.

It is expected that an exclusion zone, decontamination zone, and support zone will only be established during the remedial work required to excavate the CVOC hotspot areas. A licensed Environmental Contractor with relative hazardous material handling experience and training is required to perform any soil disturbing activities within the hotspots identified within the Remedial Action Work Plan. All onsite workers must provide evidence of OSHA 40-hour Hazardous Waste Operations and Emergency Response Operations training to conduct work within the exclusion zone established by the site safety officer. The exclusion zone is defined by the site safety officer but will typically be a 50-foot area around work activities. Gross decontamination (as determined by the site Health and Safety Officer) is conducted in the exclusion zone; all other decontamination is performed in the decontamination zone or trailer.

Protective equipment is removed in the decontamination zone. Disposable protective equipment is stored in receptacles staged in the decontamination zone, and non-disposable equipment is decontaminated. All personnel and equipment exit the exclusion zone through the decontamination zone. If a decontamination trailer is provided the first aid equipment, an eye wash unit, and drinking water are kept in the decontamination trailer.

The support zone is used for vehicle parking, daily safety meetings, and supply storage. Eating, drinking, and smoking are permitted only in the support zone. When a decontamination trailer is not provided, the eye wash unit, first aid equipment, and drinking water are kept at a central location designated by the site safety officer.

6.1 General Site Work

Upon completion of CVOC hotspot remedial activities by an Environmental Contractor, a general excavation contractor may continue with site excavation/grading as needed for basement excavation, shoring, other building requirements, or as necessary to excavate petroleum related VOC contaminated soil as deemed necessary by the Remedial Action Work Plan and/or Project Manager. All onsite employees must have obtained OSHA 24-hour Hazardous Waste Operations and Emergency Response Operations training prior to performing soil disturbing activities.

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7.0 CONTINGENCY PLAN/EMERGENCY RESPONSE PLAN

Site personnel must be prepared in the event of an emergency. Emergencies can take many forms: illnesses, injuries, chemical exposure, fires, explosions, spills, leaks, releases of harmful contaminants, or sudden changes in the weather.

Emergency telephone numbers and a map to the hospital will be posted in the command post. Site personnel should be familiar with the emergency procedures, and the locations of site safety, first aid, and communication equipment.

7.1 Emergency Equipment On-site

Private telephones:	Site personnel.
Two-way radios:	Site personnel where necessary.
Emergency Alarms:	On-site vehicle horns*.
First aid kits:	On-site, in vehicles or office.
Fire extinguisher:	On-site, in office or on equipment.

* Horns: Air horns will be supplied to personnel at the discretion of the project superintendent or site safety officer.

7.2 Emergency Telephone Numbers

General Emergencies	911
Suffolk County Police	911
NYC Fire Department	911
Jamaica Hospital Medical Center	(718) 206-6000
NYSDEC Spills Hotline	1-800-457-7362
NYSDEC Project Manager	(718) 482-4909
NYC Department of Health	(212) 676-2400
National Response Center	1-800-424-8802
Poison Control	1-800-222-1222
Project Manager	1-631-504-6000
Site Safety Officer	1-631-504-6000

7.3 Personnel Responsibilities During an Emergency

The project manager is primarily responsible for responding to and correcting any emergency situations. However, in the absence of the project manager, the site safety officer shall act as the project manager's on-site designee and perform the following tasks:

- Take appropriate measures to protect personnel including: withdrawal from the exclusion zone, evacuate and secure the site, or upgrade/downgrade the level of protective clothing and respiratory protection;

- Ensure that appropriate federal, state, and local agencies are informed and emergency response plans are coordinated. In the event of fire or explosion, the local fire department should be summoned immediately. If toxic materials are released to the air, the local authorities should be informed in order to assess the need for evacuation;

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- Ensure appropriate decontamination, treatment, or testing for exposed or injured personnel;

- Determine the cause of incidents and make recommendations to prevent recurrence; and,

- Ensure that all required reports have been prepared.

The following key personnel are planned for this project:

- Project Manager — Mr. Kevin Brussee (631) 504-6000
- Construction Superintendent — Mr. Richard Powers (516) 374-3336
- Site Safety Officer — Mr. Kevin Waters (631) 504-6000

7.4 Medical Emergencies

A person who becomes ill or injured in the exclusion zone will be decontaminated to the maximum extent possible. If the injury or illness is minor, full decontamination will be completed and first aid administered prior to transport. First aid will be administered while waiting for an ambulance or paramedics. A Field Accident Report (**Appendix D**) must be filled out for any injury.

A person transporting an injured/exposed person to a clinic or hospital for treatment will take the directions to the hospital (**Appendix D**).and information on the chemical(s) to which they may have been exposed (**Appendix C**).

7.5 Fire or Explosion

In the event of a fire or explosion, the local fire department will be summoned immediately. The site safety officer or his designated alternate will advise the fire commander of the location, nature and identification of the hazardous materials on-site. If it is safe to do so, site personnel may:

- use fire fighting equipment available on site; or,
- remove or isolate flammable or other hazardous materials that may contribute to the fire.

7.6 Evacuation Routes

Evacuation routes established by work area locations for each site will be reviewed prior to commencing site operations. As the work areas change, the evacuation routes will be altered accordingly, and the new route will be reviewed.

Under extreme emergency conditions, evacuation is to be immediate without regard for equipment. The evacuation signal will be a continuous blast of a vehicle horn, if possible, and/or by verbal/radio communication. When evacuating the site, personnel will follow these instructions:

- Keep upwind of smoke, vapors, or spill location.

- Exit through the decontamination corridor if possible.

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- If evacuation through the decontamination corridor is not possible, personnel should remove contaminated clothing once they are in a safe location and leave it near the exclusion zone or in a safe place.

- The site safety officer will conduct a head count to ensure that all personnel have been evacuated safely. The head count will be correlated to the site and/or exclusion zone entry/exit log.

- If emergency site evacuation is necessary, all personnel are to escape the emergency situation and decontaminate to the maximum extent practical.

7.7 Spill Control Procedures

Spills associated with site activities may be attributed to project equipment and include gasoline, diesel and hydraulic oil. In the event of a leak or a release, site personnel will inform their supervisor immediately, locate the source of spillage and stop the flow if it can be done safely. A spill containment kit including absorbent pads, booms and/or granulated speedy dry absorbent material will be available to site personnel to facilitate the immediate recovery of the spilled material. Daily inspections of site equipment components including hydraulic lines, fuel tanks, etc. will be performed by their respective operators as a preventative measure for equipment leaks and to ensure equipment soundness. In the event of a spill, site personnel will immediately notify the NYSDEC (1-800-457-7362), and a spill number will be generated.

7.8 Vapor Release Plan

If work zone organic vapor (excluding methane) exceeds 5 ppm, then a downwind reading will be made either 200 feet from the work zone or at the property line, whichever is closer. If readings at this location exceed 5 ppm over background, the work will be stopped.

If 5 ppm of VOCs are recorded over background on a PID at the property line, then an off-site reading will be taken within 20 feet of the nearest residential or commercial property, whichever is closer. If efforts to mitigate the emission source are unsuccessful for 30 minutes, then the designated site safety officer will:

- contact the local police;
- continue to monitor air every 30 minutes, 20 feet from the closest off-site property. If two successive readings are below 5 ppm (non-methane), off-site air monitoring will be halted.
- All property line and off site air monitoring locations and results associated with vapor releases will be recorded in the site safety log book.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

APPENDIX A

SITE SAFETY ACKNOWLEDGEMENT FORM

DAILY BREIFING SIGN-IN SHEET

Date:_____ Person Conducting Briefing:_____

Project Name and Location:_____

1. AWARENESS (topics discussed, special safety concerns, recent incidents, etc…):

_____

_____

_____

_____

2. OTHER ISSUES (HASP changes, attendee comments, etc…):

_____

_____

_____

3. ATTENDEES (Print Name):

1.	11.
2.	12.
3.	13.
4.	14.
5.	15.
6.	16.
7.	17.
8.	18.
9.	19.

APPENDIX B

SITE SAFETY PLAN AMENDMENTS

SITE SAFETY PLAN AMENDMENT FORM

Site Safety Plan Amendment #:_____

Site Name: _____

Reason for Amendment:_____

_____

_____

_____

Alternative Procedures:_____

_____

_____

_____

Required Changes in PPE:_____

_____

_____

_____

_____ _____

Project Superintendent (signature) Date

_____ _____

Health and Safety Consultant (signature) Date

APPENDIX C

CHEMICAL HAZARDS

CHEMICAL HAZARDS

The attached International Chemical Safety Cards are provided for contaminants of concern that have been identified in soils and/or groundwater at the site.

International Chemical Safety Cards

ACETONE

ICSC: 0087

2-Propanone
Dimethyl ketone
Methyl ketone
C_3H_6O / CH_3COCH_3
Molecular mass: 58.1

ICSC # 0087
CAS # 67-64-1
RTECS # AL3150000
UN # 1090
EC # 606-001-00-8
April 22, 1994 Validated
Fi, review at IHE: 10/09/89

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Highly flammable.	NO open flames, NO sparks, and NO smoking.	Powder, alcohol-resistant foam, water in large amounts, carbon dioxide.
EXPLOSION	Vapour/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Do NOT use compressed air for filling, discharging, or handling.	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE			
•INHALATION	Sore throat. Cough. Confusion. Headache. Dizziness. Drowsiness. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	Dry skin.	Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
•EYES	Redness. Pain. Blurred vision. Possible corneal damage.	Safety spectacles or face shield . Contact lenses should not be worn.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Nausea. Vomiting. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Personal protection: self-contained breathing apparatus. Ventilation. Collect leaking liquid in sealable containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Then wash away with plenty of water.	Fireproof. Separated from strong oxidants. Store in an area without drain or sewer access.	F symbol Xi symbol R: 11-36-66-67 S: 2-9-16-26 UN Hazard Class: 3 UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK

International Chemical Safety Cards

ACETONE

ICSC: 0087

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:
The vapour is heavier than air and may travel along the ground; distant ignition possible.

CHEMICAL DANGERS:
The substance can form explosive peroxides on contact with strong oxidants such as acetic acid, nitric acid, hydrogen peroxide. Reacts with chloroform and bromoform under basic conditions, causing fire and explosion hazard. Attacks plastic.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 500 ppm as TWA, 750 ppm as STEL; A4 (not classifiable as a human carcinogen); BEI issued; (ACGIH 2004).
MAK: 500 ppm 1200 mg/m³
Peak limitation category: I(2); Pregnancy risk group: D; (DFG 2006).
OSHA PEL†: TWA 1000 ppm (2400 mg/m^3)
NIOSH REL: TWA 250 ppm (590 mg/m^3)
NIOSH IDLH: 2500 ppm 10%LEL See: 67641

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation and through the skin.

INHALATION RISK:
A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C; on spraying or dispersing, however, much faster.

EFFECTS OF SHORT-TERM EXPOSURE:
The vapour irritates the eyes and the respiratory tract. The substance may cause effects on the central nervous system , liver , kidneys and gastrointestinal tract .

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the blood and bone marrow .

PHYSICAL PROPERTIES

Boiling point: 56°C
Melting point: -95°C
Relative density (water = 1): 0.8
Solubility in water:
miscible
Vapour pressure, kPa at 20°C: 24

Relative vapour density (air = 1): 2.0
Relative density of the vapour/air-mixture at 20°C (air = 1): 1.2
Flash point: -18°C c.c.
Auto-ignition temperature: 465°C
Explosive limits, vol% in air: 2.2-13
Octanol/water partition coefficient as log Pow: -0.24

ENVIRONMENTAL DATA

N O T E S

Use of alcoholic beverages enhances the harmful effect.

Transport Emergency Card: TEC (R)-30S1090

NFPA Code: H 1; F 3; R 0;
Card has been partially updated in July 2007: see Occupational Exposure Limits.
Card has been partially updated in January 2008: see Storage.

ADDITIONAL INFORMATION

International Chemical Safety Cards

TETRACHLOROETHYLENE

ICSC: 0076

1,1,2,2-Tetrachloroethylene
Perchloroethylene
Tetrachloroethene
C_2Cl_4 / $Cl_2C=CCl_2$
Molecular mass: 165.8

ICSC # 0076
CAS # 127-18-4
RTECS # KX3850000
UN # 1897
EC # 602-028-00-4
April 13, 2000 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			
EXPOSURE		STRICT HYGIENE! PREVENT GENERATION OF MISTS!	
•INHALATION	Dizziness. Drowsiness. Headache. Nausea. Weakness. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
•SKIN	Dry skin. Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness. Pain.	Safety goggles , face shield .	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Give plenty of water to drink. Rest.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Ventilation. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. Personal protection: filter respirator for organic gases and vapours.	Separated from metals ,(see Chemical Dangers), food and feedstuffs . Keep in the dark. Ventilation along the floor.	Do not transport with food and feedstuffs. Marine pollutant. Xn symbol N symbol R: 40-51/53 S: (2-)23-36/37-61 UN Hazard Class: 6.1 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0076

International Chemical Safety Cards

TETRACHLOROETHYLENE

ICSC: 0076

I M P O R T A N T D A T A

PHYSICAL STATE; APPEARANCE:
COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:
The vapour is heavier than air.

CHEMICAL DANGERS:
On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive fumes (hydrogen chloride, phosgene, chlorine). The substance decomposes slowly on contact with moisture producing trichloroacetic acid and hydrochloric acid. Reacts with metals such as aluminium, lithium, barium, beryllium.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 25 ppm as TWA, 100 ppm as STEL; A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued; (ACGIH 2004).
MAK: skin absorption (H);
Carcinogen category: 3B;
(DFG 2004).
OSHA PEL†: TWA 100 ppm C 200 ppm 300 ppm (5-minute maximum peak in any 3-hours)
NIOSH REL: Ca Minimize workplace exposure concentrations. See Appendix A
NIOSH IDLH: Ca 150 ppm See: 127184

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation and by ingestion.

INHALATION RISK:
A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance is irritating to the eyes , the skin and the respiratory tract . If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. The substance may cause effects on the central nervous system. Exposure at high levels may result in unconsciousness.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the liver and kidneys. This substance is probably carcinogenic to humans.

PHYSICAL PROPERTIES

Boiling point: 121°C
Melting point: -22°C
Relative density (water = 1): 1.6
Solubility in water, g/100 ml at 20°C: 0.015

Vapour pressure, kPa at 20°C: 1.9
Relative vapour density (air = 1): 5.8
Relative density of the vapour/air-mixture at 20°C (air = 1): 1.09
Octanol/water partition coefficient as log Pow: 2.9

ENVIRONMENTAL DATA

The substance is toxic to aquatic organisms. The substance may cause long-term effects in the aquatic environment.

N O T E S

Depending on the degree of exposure, periodic medical examination is suggested. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding. An added stabilizer or inhibitor can influence the toxicological properties of this substance, consult an expert. Card has been partly updated in April 2005. See section Occupational Exposure Limits.

Transport Emergency Card: TEC (R)-61S1897

NFPA Code: H2; F0; R0;

ADDITIONAL INFORMATION

International Chemical Safety Cards

1,2-DICHLOROETHYLENE

ICSC: 0436

1,2-Dichloroethene
Acetylene dichloride
symmetrical Dichloroethylene
$C_2H_2Cl_2$ / ClCH=CHCl
Molecular mass: 96.95

ICSC # 0436
CAS # 540-59-0
RTECS # KV9360000
UN # 1150
EC # 602-026-00-3
July 05, 2003 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Highly flammable. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking.	Powder, water spray, foam, carbon dioxide.
EXPLOSION	Vapour/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Do NOT use compressed air for filling, discharging, or handling.	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		STRICT HYGIENE!	
•INHALATION	Cough. Sore throat. Dizziness. Nausea. Drowsiness. Weakness. Unconsciousness. Vomiting.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	Dry skin.	Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
•EYES	Redness. Pain.	Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Give plenty of water to drink. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Remove all ignition sources. Ventilation. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in dry sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. (Extra personal protection: complete protective clothing including self-contained breathing apparatus.)	Fireproof. Well closed. See Chemical Dangers.	Note: C F symbol Xn symbol R: 11-20-52/53 S: 2-7-16-29-61 UN Hazard Class: 3 UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0436

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

1,2-DICHLOROETHYLENE

ICSC: 0436

I M P O R T A N T D A T A

PHYSICAL STATE; APPEARANCE:
COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:
The vapour is heavier than air and may travel along the ground; distant ignition possible.

CHEMICAL DANGERS:
The substance decomposes on heating or under the influence of air , light and moisture producing toxic and corrosive fumes including hydrogen chloride . Reacts with strong oxidants. Reacts with copper or copper alloys, and bases to produce toxic chloroacetylene which is spontaneously flammable in contact with air. Attacks plastic.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 200 ppm as TWA; (ACGIH 2003).
MAK: 200 ppm, 800 mg/m³;
Peak limitation category: II(2);
(DFG 2002).
OSHA PEL: TWA 200 ppm (790 mg/m^3)
NIOSH REL: TWA 200 ppm (790 mg/m^3)
NIOSH IDLH: 1000 ppm See: 540590

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation of its vapour and by ingestion.

INHALATION RISK:
A harmful contamination of the air will be reached quickly on evaporation of this substance at 20°C; on spraying or dispersing, however, much faster.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance is irritating to the eyes and the respiratory tract . The substance may cause effects on the central nervous system at high levels , resulting in lowering of consciousness .

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The liquid defats the skin. The substance may have effects on the liver .

PHYSICAL PROPERTIES

Boiling point: 55°C
Relative density (water = 1): 1.28
Solubility in water: poor
Relative vapour density (air = 1): 3.34
Flash point: 2°C c.c.
Auto-ignition temperature: 460°C
Explosive limits, vol% in air: 9.7-12.8
Octanol/water partition coefficient as log Pow: 2

ENVIRONMENTAL DATA

N O T E S

This compound has two isomers, cis and trans.Data for the isomers: cis-isomer (CAS 156-59-2), trans isomer (CAS 156-60-5), other boiling point 60.3, melting point -81.5°C (cis), -49.4°C (trans); flash point c.c. 6°C (cis), 2-4°C (trans); relative density (water = 1) 1.28 (cis), 1.26 (trans); vapour pressure 24.0 kPa (cis), 35.3 kPa (trans) at 20°C; relative density of the vapour/air-mixture at 20°C (air = 1): 1.6 (cis), 1.8 (trans); octanol/water partition coefficient as log Pow: 1.86 (cis), 2.09 (trans). Depending on the degree of exposure, periodic medical examination is suggested.

Transport Emergency Card: TEC (R)-30GF1-I+II

NFPA Code: H2; F3; R2;

ADDITIONAL INFORMATION

International Chemical Safety Cards

TRICHLOROETHYLENE

ICSC: 0081

1,1,2-Trichloroethylene
Trichloroethene
Ethylene trichloride
Acetylene trichloride
C_2HCl_3 / $ClCH=CCl_2$
Molecular mass: 131.4

ICSC # 0081
CAS # 79-01-6
RTECS # KX4550000
UN # 1710
EC # 602-027-00-9
April 10, 2000 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible under specific conditions. See Notes.		In case of fire in the surroundings: all extinguishing agents allowed.
EXPLOSION		Prevent build-up of electrostatic charges (e.g., by grounding).	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		PREVENT GENERATION OF MISTS! STRICT HYGIENE!	
•**INHALATION**	Dizziness. Drowsiness. Headache. Weakness. Nausea. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
•**SKIN**	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•**EYES**	Redness. Pain.	Safety spectacles, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•**INGESTION**	Abdominal pain. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Give plenty of water to drink. Rest.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Ventilation. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Personal protection: filter respirator for organic gases and vapours. Do NOT let this chemical enter the environment.	Separated from metals (see Chemical Dangers), strong bases, food and feedstuffs . Dry. Keep in the dark. Ventilation along the floor.	Do not transport with food and feedstuffs. Marine pollutant. T symbol R: 45-36/38-52/53-67 S: 53-45-61 UN Hazard Class: 6.1 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

International Chemical Safety Cards

TRICHLOROETHYLENE

ICSC: 0081

I M P O R T A N T D A T A

PHYSICAL STATE; APPEARANCE:
COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:
The vapour is heavier than air. As a result of flow, agitation, etc., electrostatic charges can be generated.

CHEMICAL DANGERS:
On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive fumes (phosgene , hydrogen chloride). The substance decomposes on contact with strong alkali producing dichloroacetylene , which increases fire hazard. Reacts violently with metal powders such as magnesium, aluminium, titanium, and barium. Slowly decomposed by light in presence of moisture, with formation of corrosive hydrochloric acid.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 50 ppm as TWA; 100 ppm as STEL; A5; BEI issued; (ACGIH 2004).
MAK:
Carcinogen category: 1; Germ cell mutagen group: 3B; (DFG 2004).
OSHA PEL†: TWA 100 ppm C 200 ppm 300 ppm (5-minute maximum peak in any 2 hours)
NIOSH REL: Ca See Appendix A See Appendix C
NIOSH IDLH: Ca 1000 ppm See: 79016

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation and by ingestion.

INHALATION RISK:
A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance is irritating to the eyes and the skin . Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis. The substance may cause effects on the central nervous system , resulting in respiratory failure . Exposure could cause lowering of consciousness.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the central nervous system , resulting in loss of memory. The substance may have effects on the liver and kidneys (see Notes). This substance is probably carcinogenic to humans.

PHYSICAL PROPERTIES

Boiling point: 87°C
Melting point: -73°C
Relative density (water = 1): 1.5
Solubility in water, g/100 ml at 20°C: 0.1
Vapour pressure, kPa at 20°C: 7.8
Relative vapour density (air = 1): 4.5
Relative density of the vapour/air-mixture at 20°C (air = 1): 1.3
Auto-ignition temperature: 410°C
Explosive limits, vol% in air: 8-10.5
Octanol/water partition coefficient as log Pow: 2.42
Electrical conductivity (NOT on card): 800pS/m

ENVIRONMENTAL DATA

The substance is harmful to aquatic organisms. The substance may cause long-term effects in the aquatic environment.

N O T E S

Combustible vapour/air mixtures difficult to ignite, may be developed under certain conditions. Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is suggested. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding. An added stabilizer or inhibitor can influence the toxicological properties of this substance, consult an expert. Card has been partly updated in October 2004. See sections Occupational Exposure Limits, EU classification, Emergency Response.

Transport Emergency Card: TEC (R)-61S1710

NFPA Code: H2; F1; R0;

ADDITIONAL INFORMATION

ICSC: 0081 **TRICHLOROETHYLENE**

International Chemical Safety Cards

VINYL CHLORIDE

ICSC: 0082

Chloroethene
Chloroethylene
VCM
C_2H_3Cl / $H_2C=CHCl$
Molecular mass: 62.5
(cylinder)

ICSC # 0082
CAS # 75-01-4
RTECS # KU9625000
UN # 1086 (stabilized)
EC # 602-023-00-7
April 13, 2000 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Extremely flammable. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking.	Shut off supply; if not possible and no risk to surroundings, let the fire burn itself out; in other cases extinguish with powder, carbon dioxide.
EXPLOSION	Gas/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Use non-sparking handtools.	In case of fire: keep cylinder cool by spraying with water. Combat fire from a sheltered position.
EXPOSURE		AVOID ALL CONTACT!	IN ALL CASES CONSULT A DOCTOR!
•INHALATION	Dizziness. Drowsiness. Headache. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	ON CONTACT WITH LIQUID: FROSTBITE.	Protective gloves. Cold-insulating gloves. Protective clothing.	ON FROSTBITE: rinse with plenty of water, do NOT remove clothes.
•EYES	Redness. Pain.	Safety goggles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Consult an expert! Ventilation. Remove all ignition sources. Personal protection: complete protective clothing including self-contained breathing apparatus.	Fireproof. Separated from incompatible materials .(See Chemical Dangers.) Cool. Store only if stabilized.	Note: D F+ symbol T symbol R: 45-12 S: 53-45 UN Hazard Class: 2.1

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0082

International Chemical Safety Cards

VINYL CHLORIDE

ICSC: 0082

I M P O R T A N T D A T A

PHYSICAL STATE; APPEARANCE:
COLOURLESS COMPRESSED LIQUEFIED GAS , WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:
The gas is heavier than air, and may travel along the ground; distant ignition possible. Vinyl chloride monomer vapours are uninhibited and may form polymers in vents or flame arresters of storage tanks, resulting in blockage of vents.

CHEMICAL DANGERS:
The substance can under specific circumstances form peroxides, initiating explosive polymerization. The substance will polymerize readily due to heating and under the influence of air, light and on contact with a catalyst, strong oxidizing agents and metals such as copper and aluminium, with fire or explosion hazard. The substance decomposes on burning producing toxic and corrosive fumes (hydrogen chloride , phosgene). Attacks iron and steel in the presence of moisture.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 1 ppm as TWA; A1 (confirmed human carcinogen); (ACGIH 2004).
MAK:
Carcinogen category: 1;
(DFG 2004).
OSHA PEL: 1910.1017 TWA 1 ppm C 5 ppm 15-minute
NIOSH REL: Ca See Appendix A
NIOSH IDLH: Ca N.D. See: IDLH INDEX

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation.

INHALATION RISK:
A harmful concentration of this gas in the air will be reached very quickly on loss of containment.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance is irritating to the eyes . The liquid may cause frostbite. The substance may cause effects on the central nervous system . Exposure could cause lowering of consciousness. Medical observation is indicated.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The substance may have effects on the liver, spleen, blood andperipheral blood vessels, and tissue and bones of the fingers. This substance is carcinogenic to humans.

PHYSICAL PROPERTIES

Boiling point: -13°C
Melting point: -154°C
Relative density (water = 1): 0.9 (liquid)
Density: 8 (vapour) at 15°C
g/l
Solubility in water:
none
Relative vapour density (air = 1): 2.2
Flash point:
-78°C c.c.
Auto-ignition temperature: 472°C
Explosive limits, vol% in air: 3.6-33
Octanol/water partition coefficient as log Pow: 0.6

ENVIRONMENTAL DATA

This substance may be hazardous to the environment; special attention should be given to ground water contamination.

N O T E S

Depending on the degree of exposure, periodic medical examination is suggested. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding. An added stabilizer or inhibitor can influence the toxicological properties of this substance, consult an expert. Card has been partly updated in April 2005. See section Occupational Exposure Limits.

Transport Emergency Card: TEC (R)-20S1086

NFPA Code: H 2; F 4; R 2;

ADDITIONAL INFORMATION

International Chemical Safety Cards

1,2,4-TRIMETHYLBENZENE

ICSC: 1433

Pseudocumene

C_9H_{12}

Molecular mass: 120,2

ICSC # 1433
CAS # 95-63-6
RTECS # DC3325000
UN # 1993
EC # 601-043-00-3
March 06, 2002 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Flammable.	NO open flames, NO sparks, and NO smoking.	Alcohol-resistant foam, dry powder, carbon dioxide.
EXPLOSION	Above 44°C explosive vapour/air mixtures may be formed.	Above 44°C use a closed system, ventilation, and explosion-proof electrical equipment. Prevent build-up of electrostatic charges (e.g., by grounding).	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		PREVENT GENERATION OF MISTS!	
•INHALATION	Confusion. Cough. Dizziness. Drowsiness. Headache. Sore throat. Vomiting.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	Redness. Dry skin.	Protective gloves.	Rinse skin with plenty of water or shower.
•EYES	Redness. Pain.	Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	(See Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. Personal protection: filter respirator for organic gases and vapours.	Fireproof. Separated from strong oxidants. Well closed. Keep in a well-ventilated room.	Xn symbol N symbol R: 10-20-36/37/38-51/53 S: 2-26-61 UN Hazard Class: 3 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

ICSC: 1433

International Chemical Safety Cards

1,2,4-TRIMETHYLBENZENE

ICSC: 1433

IMPORTANT DATA	**PHYSICAL STATE; APPEARANCE:** COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR. **PHYSICAL DANGERS:** **CHEMICAL DANGERS:** The substance decomposes on burning producing toxic and irritating fumes Reacts violently with strong oxidants causing fire and explosion hazard. **OCCUPATIONAL EXPOSURE LIMITS:** TLV: (as mixed isomers) 25 ppm as TWA (ACGIH 2004). MAK: (as mixed isomers) 20 ppm 100 mg/m³ Peak limitation category: II(2) Pregnancy risk group: C (DFG 2004). OSHA PEL†: none NIOSH REL: TWA 25 ppm (125 mg/m^3) NIOSH IDLH: N.D. See: IDLH INDEX	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation. **INHALATION RISK:** A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C; on spraying or dispersing, however, much faster. **EFFECTS OF SHORT-TERM EXPOSURE:** The substance is irritating to the eyes the skin and the respiratory tract If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. The substance may cause effects on the central nervous system **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** The liquid defats the skin. Lungs may be affected by repeated or prolonged exposure , resulting in chronic bronchitis The substance may have effects on the central nervous system blood See Notes.
PHYSICAL PROPERTIES	Boiling point: 169°C Melting point: -44°C Relative density (water = 1): 0.88 Solubility in water: very poor Relative vapour density (air = 1): 4.1	Relative density of the vapour/air-mixture at 20°C (air = 1): 1.01 Flash point: 44°C c.c. Auto-ignition temperature: 500°C Explosive limits, vol% in air: 0.9-6.4 Octanol/water partition coefficient as log Pow: 3.8
ENVIRONMENTAL DATA	The substance is toxic to aquatic organisms. Bioaccumulation of this chemical may occur in fish. 	

N O T E S

Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is suggested. See also ICSC 1155 1,3,5-Trimethylbenzene (Mesitylene), ICSC 1362 1,2,3-Trimethylbenzene (Hemimellitene), ICSC 1389 Trimethyl benzene (mixed isomers). 1,3,5-Trimethylbenzene (Mesitylene) is classified as a marine pollutant.

Transport Emergency Card: TEC (R)-30GF1-III
NFPA Code: H0; F2; R0;

ADDITIONAL INFORMATION

International Chemical Safety Cards

1,3,5-TRIMETHYLBENZENE

ICSC: 1155

Mesitylene
C_9H_{12}
Molecular mass: 120.2

ICSC # 1155
CAS # 108-67-8
RTECS # OX6825000
UN # 2325
EC # 601-025-00-5
March 06, 2002 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Flammable.	NO open flames, NO sparks, and NO smoking.	Alcohol-resistant foam, dry powder, carbon dioxide.
EXPLOSION	Above 50°C explosive vapour/air mixtures may be formed.	Above 50°C use a closed system, ventilation, and explosion-proof electrical equipment. Prevent build-up of electrostatic charges (e.g., by grounding).	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		PREVENT GENERATION OF MISTS!	
•INHALATION	Confusion. Cough. Dizziness. Drowsiness. Headache. Sore throat. Vomiting.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	Redness. Dry skin.	Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
•EYES	Redness. Pain.	Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	(See Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. (Extra personal protection: filter respirator for organic gases and vapours.)	Fireproof. Separated from strong oxidants. Well closed. Keep in a well-ventilated room.	Marine pollutant. Xi symbol N symbol R: 10-37-51/53 S: 2-61 UN Hazard Class: 3 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

ICSC: 1155

International Chemical Safety Cards

1,3,5-TRIMETHYLBENZENE

ICSC: 1155

IMPORTANT DATA	**PHYSICAL STATE; APPEARANCE:** COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR. **PHYSICAL DANGERS:** **CHEMICAL DANGERS:** The substance decomposes on burning producing toxic and irritating fumes. Reacts violently with strong oxidants causing fire and explosion hazard. **OCCUPATIONAL EXPOSURE LIMITS:** TLV (as mixed isomers): 25 ppm; (ACGIH 2001). MAK (all isomers): 20 ppm; 100 mg/m^3; class II 1 © (2001) OSHA PEL†: none NIOSH REL: TWA 25 ppm (125 mg/m^3) NIOSH IDLH: N.D. See: IDLH INDEX **ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation. **INHALATION RISK:** A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C; on spraying or dispersing, however, much faster. **EFFECTS OF SHORT-TERM EXPOSURE:** The substance is irritating to the eyes the skin and the respiratory tract If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. The substance may cause effects on the central nervous system. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** The liquid defats the skin. Lungs may be affected by repeated or prolonged exposure, resulting in chronic bronchitis. The substance may have effects on the central nervous system blood See Notes.
PHYSICAL PROPERTIES	Boiling point: 165°C Melting point: -45°C Relative density (water = 1): 0.86 Solubility in water: very poor Vapour pressure, kPa at 20°C: 0.25 Relative vapour density (air = 1): 4.1 Relative density of the vapour/air-mixture at 20°C (air = 1): 1.01 Flash point: 50°C (c.c.) Auto-ignition temperature: 550°C Octanol/water partition coefficient as log Pow: 3.42
ENVIRONMENTAL DATA	The substance is harmful to aquatic organisms. Bioaccumulation of this chemical may occur in fish. 

NOTES

Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is indicated. See ICSC 1433 1,2,4-Trimethylbenzene (Pseudocumene), ICSC 1362 1,2,3-Trimethylbenzene (Hemimellitene), ICSC 1389 Trimethyl benzene (mixed isomers).

Transport Emergency Card: TEC (R)-30S2325
NFPA Code: H0; F2; R0

ADDITIONAL INFORMATION

International Chemical Safety Cards

ETHYLBENZENE

ICSC: 0268

Ethylbenzol
Phenylethane
EB
C_8H_{10} / $C_6H_5C_2H_5$
Molecular mass: 106.2

ICSC # 0268
CAS # 100-41-4
RTECS # DA0700000
UN # 1175
EC # 601-023-00-4
March 13, 1995 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Highly flammable.	NO open flames, NO sparks, and NO smoking.	Powder, AFFF, foam, carbon dioxide.
EXPLOSION	Vapour/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Do NOT use compressed air for filling, discharging, or handling.	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		PREVENT GENERATION OF MISTS!	
•INHALATION	Cough. Dizziness. Drowsiness. Headache.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness. Pain. Blurred vision.	Face shield or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	(Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Give a slurry of activated charcoal in water to drink. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Ventilation. Collect leaking liquid in covered containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Personal protection: A filter respirator for organic gases and vapours.	Fireproof. Separated from strong oxidants.	F symbol Xn symbol R: 11-20 S: 2-16-24/25-29 UN Hazard Class: 3 UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0268

International Chemical Safety Cards

ETHYLBENZENE

ICSC: 0268

IMPORTANT DATA	**PHYSICAL STATE; APPEARANCE:** COLOURLESS LIQUID , WITH AROMATIC ODOUR. **PHYSICAL DANGERS:** The vapour mixes well with air, explosive mixtures are easily formed. **CHEMICAL DANGERS:** Reacts with strong oxidants. Attacks plastic and rubber. **OCCUPATIONAL EXPOSURE LIMITS:** TLV: 100 ppm as TWA 125 ppm as STEL A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued (ACGIH 2005). MAK: skin absorption (H); Carcinogen category: 3A; (DFG 2004). OSHA PEL†: TWA 100 ppm (435 mg/m^3) NIOSH REL: TWA 100 ppm (435 mg/m^3) ST 125 ppm (545 mg/m^3) NIOSH IDLH: 800 ppm 10%LEL See: 100414	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation of its vapour, through the skin and by ingestion. **INHALATION RISK:** A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C. **EFFECTS OF SHORT-TERM EXPOSURE:** The substance is irritating to the eyes the skin and the respiratory tract Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis. The substance may cause effects on the central nervous system Exposure far above the OEL could cause lowering of consciousness. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** Repeated or prolonged contact with skin may cause dermatitis.
PHYSICAL PROPERTIES	Boiling point: 136°C Melting point: -95°C Relative density (water = 1): 0.9 Solubility in water, g/100 ml at 20°C: 0.015 Vapour pressure, kPa at 20°C: 0.9 Relative vapour density (air = 1): 3.7	Relative density of the vapour/air-mixture at 20°C (air = 1): 1.02 Flash point: 18°C c.c. Auto-ignition temperature: 432°C Explosive limits, vol% in air: 1.0-6.7 Octanol/water partition coefficient as log Pow: 3.2
ENVIRONMENTAL DATA	The substance is harmful to aquatic organisms. 	

N O T E S

The odour warning when the exposure limit value is exceeded is insufficient.

Transport Emergency Card: TEC (R)-30S1175 or 30GF1-I+II
NFPA Code: H2; F3; R0

ADDITIONAL INFORMATION

IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

m-XYLENE

ICSC: 0085

meta-Xylene
1,3-Dimethylbenzene
m-Xylol
$C_6H_4(CH_3)_2$ / C_8H_{10}
Molecular mass: 106.2

ICSC # 0085
CAS # 108-38-3
RTECS # ZE2275000
UN # 1307
EC # 601-022-00-9
August 03, 2002 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Flammable.	NO open flames, NO sparks, and NO smoking.	Powder, water spray, foam, carbon dioxide.
EXPLOSION	Above 27°C explosive vapour/air mixtures may be formed.	Above 27°C use a closed system, ventilation, and explosion-proof electrical equipment. Prevent build-up of electrostatic charges (e.g., by grounding).	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		STRICT HYGIENE!	
•INHALATION	Dizziness. Drowsiness. Headache. Nausea.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness. Pain.	Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Burning sensation. Abdominal pain. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Ventilation. Remove all ignition sources. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. (Extra personal protection: filter respirator for organic gases and vapours.)	Fireproof. Separated from strong oxidants strong acids	Note: C Xn symbol R: 10-20/21-38 S: 2-25 UN Hazard Class: 3 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0085

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

TOLUENE

ICSC: 0078

Methylbenzene
Toluol
Phenylmethane
$C_6H_5CH_3$ / C_7H_8
Molecular mass: 92.1

ICSC # 0078
CAS # 108-88-3
RTECS # XS5250000
UN # 1294
EC # 601-021-00-3
October 10, 2002 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Highly flammable.	NO open flames, NO sparks, and NO smoking.	Powder, AFFF, foam, carbon dioxide.
EXPLOSION	Vapour/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Prevent build-up of electrostatic charges (e.g., by grounding). Do NOT use compressed air for filling, discharging, or handling. Use non-sparking handtools.	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
•INHALATION	Cough. Sore throat. Dizziness. Drowsiness. Headache. Nausea. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
•EYES	Redness. Pain.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Burning sensation. Abdominal pain. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area in large spill! Consult an expert in large spill! Remove all ignition sources. Ventilation. Collect leaking liquid in sealable containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. Personal protection: self-contained breathing apparatus	Fireproof. Separated from strong oxidants.	F symbol Xn symbol R: 11-38-48/20-63-65-67 S: 2-36/37-46-62 UN Hazard Class: 3 UN Packing Group: II

ICSC: 0078

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

TOLUENE

ICSC: 0078

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:
The vapour mixes well with air, explosive mixtures are formed easily. As a result of flow, agitation, etc., electrostatic charges can be generated.

CHEMICAL DANGERS:
Reacts violently with strong oxidants causing fire and explosion hazard.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 50 ppm as TWA (skin) A4 BEI issued (ACGIH 2004).
MAK: 50 ppm 190 mg/m³ H
Peak limitation category: II(4) Pregnancy risk group: C (DFG 2004).
OSHA PEL†: TWA 200 ppm C 300 ppm 500 ppm (10-minute maximum peak)
NIOSH REL: TWA 100 ppm (375 mg/m^3) ST 150 ppm (560 mg/m^3)
NIOSH IDLH: 500 ppm See: 108883

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

INHALATION RISK:
A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance is irritating to the eyes and the respiratory tract The substance may cause effects on the central nervous system If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. Exposure at high levels may result in cardiac dysrhythmiaandunconsciousness.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The liquid defats the skin. The substance may have effects on the central nervous system Exposure to the substance may enhance hearing damage caused by exposure to noise. Animal tests show that this substance possibly causes toxicity to human reproduction or development.

PHYSICAL PROPERTIES

Boiling point: 111°C
Melting point: -95°C
Relative density (water = 1): 0.87
Solubility in water: none
Vapour pressure, kPa at 25°C: 3.8
Relative vapour density (air = 1): 3.1
Relative density of the vapour/air-mixture at 20°C (air = 1): 1.01
Flash point: 4°C c.c.
Auto-ignition temperature: 480°C
Explosive limits, vol% in air: 1.1-7.1
Octanol/water partition coefficient as log Pow: 2.69

ENVIRONMENTAL DATA

The substance is toxic to aquatic organisms.

N O T E S

Depending on the degree of exposure, periodic medical examination is suggested. Use of alcoholic beverages enhances the harmful effect.

Transport Emergency Card: TEC (R)-30S1294
NFPA Code: H 2; F 3; R 0;

ADDITIONAL INFORMATION

International Chemical Safety Cards

m-XYLENE

ICSC: 0085

I M P O R T A N T D A T A	**PHYSICAL STATE; APPEARANCE:** COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR. **PHYSICAL DANGERS:** As a result of flow, agitation, etc., electrostatic charges can be generated. **CHEMICAL DANGERS:** Reacts with strong acids strong oxidants **OCCUPATIONAL EXPOSURE LIMITS:** TLV: 100 ppm as TWA 150 ppm as STEL A4 (ACGIH 2001). BEI (ACGIH 2001). MAK: 100 ppm 440 mg/m³ Peak limitation category: II(2) skin absorption (H); Pregnancy risk group: D (DFG 2005). EU OEL: 50 ppm as TWA 100 ppm as STEL (skin) (EU 2000). OSHA PEL†: TWA 100 ppm (435 mg/m^3) NIOSH REL: TWA 100 ppm (435 mg/m^3) ST 150 ppm (655 mg/m^3) NIOSH IDLH: 900 ppm See: 95476	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation, through the skin and by ingestion. **INHALATION RISK:** A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C. **EFFECTS OF SHORT-TERM EXPOSURE:** The substance is irritating to the eyes and the skin The substance may cause effects on the central nervous system If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** The liquid defats the skin. The substance may have effects on the central nervous system Animal tests show that this substance possibly causes toxicity to human reproduction or development.
PHYSICAL PROPERTIES	Boiling point: 139°C Melting point: -48°C Relative density (water = 1): 0.86 Solubility in water: none Vapour pressure, kPa at 20°C: 0.8	Relative vapour density (air = 1): 3.7 Relative density of the vapour/air-mixture at 20°C (air = 1): 1.02 Flash point: 27°C c.c. Auto-ignition temperature: 527°C Explosive limits, vol% in air: 1.1-7.0 Octanol/water partition coefficient as log Pow: 3.20
ENVIRONMENTAL DATA	The substance is toxic to aquatic organisms. 	

N O T E S

Depending on the degree of exposure, periodic medical examination is indicated. The recommendations on this Card also apply to technical xylene. See ICSC 0084 o-Xylene and 0086 p-Xylene.

NFPA Code: H 2; F 3; R 0;
Transport Emergency Card: TEC (R)-30S1307-III

ADDITIONAL INFORMATION

ICSC: 0085 **m-XYLENE**

International Chemical Safety Cards

BENZ(a)ANTHRACENE

ICSC: 0385

1,2-Benzoanthracene
Benzo(a)anthracene
2,3-Benzphenanthrene
Naphthanthracene
$C_{18}H_{12}$
Molecular mass: 228.3

ICSC # 0385
CAS # 56-55-3
RTECS # CV9275000
EC # 601-033-00-9
October 23, 1995 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.		Water spray, powder. In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		AVOID ALL CONTACT!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety goggles face shield or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Personal protection: complete protective clothing including self-contained breathing apparatus.	Well closed.	T symbol N symbol R: 45-50/53 S: 53-45-60-61

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0385

International Chemical Safety Cards

BENZ(a)ANTHRACENE

I M P O R T A N T D A T A

PHYSICAL STATE; APPEARANCE:
COLOURLESS TO YELLOW BROWN FLUORESCENT FLAKES OR POWDER.

PHYSICAL DANGERS:
Dust explosion possible if in powder or granular form, mixed with air.

CHEMICAL DANGERS:

OCCUPATIONAL EXPOSURE LIMITS:
TLV: A2 (suspected human carcinogen); (ACGIH 2004).
MAK:
Carcinogen category: 2 (as pyrolysis product of organic materials)
(DFG 2005).

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.

EFFECTS OF SHORT-TERM EXPOSURE:

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
This substance is probably carcinogenic to humans.

PHYSICAL PROPERTIES

Sublimation point: 435°C
Melting point: 162°C
Relative density (water = 1): 1.274
Solubility in water:
none

Vapour pressure, Pa at 20°C: 292
Octanol/water partition coefficient as log Pow: 5.61

ENVIRONMENTAL DATA

Bioaccumulation of this chemical may occur in seafood.

N O T E S

This substance is one of many polycyclic aromatic hydrocarbons - standards are usually established for them as mixtures, e.g., coal tar pitch volatiles. However, it may be encountered as a laboratory chemical in its pure form. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken. Do NOT take working clothes home. Tetraphene is a common name. Card has been partly updated in October 2005 and August 2006: see sections Occupational Exposure Limits, EU classification.

ADDITIONAL INFORMATION

ICSC: 0385 **BENZ(a)ANTHRACENE**

International Chemical Safety Cards

BENZO(g,h,i)FLUORANTHENE

ICSC: 0527

2,13-Benzofluoranthene
Benzo(mno)fluoranthene
$C_{18}H_{10}$
Molecular mass: 226.3

ICSC # 0527
CAS # 203-12-3
RTECS # DF6140000
March 25, 1998 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Water spray, powder.
EXPLOSION			
EXPOSURE		PREVENT DISPERSION OF DUST!	
•INHALATION		Local exhaust or breathing protection.	
•SKIN	MAY BE ABSORBED!	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention. Wear protective gloves when administering first aid.
•EYES		Safety goggles, face shield, or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.	Well closed.	R: S:

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0527

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

BENZO(g,h,i)FLUORANTHENE

ICSC: 0527

I

M

P

PHYSICAL STATE; APPEARANCE:
YELLOW CRYSTALS

PHYSICAL DANGERS:

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation of its aerosol and through the skin.

O R T A N T D A T A	**CHEMICAL DANGERS:** The substance decomposes on heating producing toxic fumes. **OCCUPATIONAL EXPOSURE LIMITS:** TLV not established.	**INHALATION RISK:** **EFFECTS OF SHORT-TERM EXPOSURE:** **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** See Notes.
PHYSICAL PROPERTIES	Melting point: 149°C Solubility in water: none Vapour pressure, Pa at 20°C: <10	Relative vapour density (air = 1): 7.8 Relative density of the vapour/air-mixture at 20°C (air = 1): 1.0 Octanol/water partition coefficient as log Pow: 7.23
ENVIRONMENTAL DATA	This substance may be hazardous to the environment; special attention should be given to the total environment. In the food chain important to humans, bioaccumulation takes place, specifically in oils and fats. 	

N O T E S

Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken. Also consult ICSC #0720 and 0721.

ADDITIONAL INFORMATION

ICSC: 0527 **BENZO(g,h,i)FLUORANTHENE**

International Chemical Safety Cards

BENZO(k)FLUORANTHENE

ICSC: 0721

Dibenzo(b,jk)fluorene
8,9-Benzofluoranthene
11,12-Benzofluoranthene
$C_{20}H_{12}$
Molecular mass: 252.3

ICSC # 0721
CAS # 207-08-9
RTECS # DF6350000
EC # 601-036-00-5
March 25, 1999 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE			In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			
EXPOSURE		AVOID ALL CONTACT!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety spectacles or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.	Provision to contain effluent from fire extinguishing. Well closed.	T symbol N symbol R: 45-50/53 S: 53-45-60-61

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0721

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

BENZO(k)FLUORANTHENE

ICSC: 0721

I **M**	**PHYSICAL STATE; APPEARANCE:** YELLOW CRYSTALS	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation of its aerosol and through the skin.

P O R T A N T D A T A	**PHYSICAL DANGERS:** **CHEMICAL DANGERS:** Upon heating, toxic fumes are formed. **OCCUPATIONAL EXPOSURE LIMITS:** TLV not established. MAK: Carcinogen category: 2; (DFG 2004). **INHALATION RISK:** Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly. **EFFECTS OF SHORT-TERM EXPOSURE:** **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** This substance is possibly carcinogenic to humans.
PHYSICAL PROPERTIES	Boiling point: 480°C Melting point: 217°C Solubility in water: none Octanol/water partition coefficient as log Pow: 6.84
ENVIRONMENTAL DATA	This substance may be hazardous to the environment; special attention should be given to air quality and water quality. Bioaccumulation of this chemical may occur in crustacea and in fish. 

N O T E S

Benzo(k)fluoranthene is present as a component of polycyclic aromatic hydrocarbons (PAH) content in the environment usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco.ACGIH recommends environment containing benzo(k)fluoranthene should be evaluated in terms of the TLV-TWA for coal tar pitch volatile, as benzene soluble 0.2 mg/m^3. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.

ADDITIONAL INFORMATION

ICSC: 0721 **BENZO(k)FLUORANTHENE**

International Chemical Safety Cards

DIBENZO(a,h)ANTHRACENE

ICSC: 0431

1,25,6-Dibenzanthracene
$C_{22}H_{14}$
Molecular mass: 278.4

ICSC # 0431
CAS # 53-70-3
RTECS # HN2625000
EC # 601-041-00-2
October 23, 1995 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Water spray, powder.
EXPLOSION			
EXPOSURE		AVOID ALL CONTACT!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN	Redness. Swelling. Itching.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness.	Face shield or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Personal protection: P3 filter respirator for toxic particles.	Well closed.	T symbol N symbol R: 45-50/53 S: 53-45-60-61

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0431

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

DIBENZO(a,h)ANTHRACENE

ICSC: 0431

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PHYSICAL STATE; APPEARANCE:
COLOURLESS CRYSTALLINE POWDER.

PHYSICAL DANGERS:

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration

R T A N T D A T A	**CHEMICAL DANGERS:** **OCCUPATIONAL EXPOSURE LIMITS:** TLV not established.	of airborne particles can, however, be reached quickly. **EFFECTS OF SHORT-TERM EXPOSURE:** **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** The substance may have effects on the skin , resulting in photosensitization. This substance is probably carcinogenic to humans.
PHYSICAL PROPERTIES	Boiling point: 524°C Melting point: 267°C Relative density (water = 1): 1.28	Solubility in water: none Octanol/water partition coefficient as log Pow: 6.5
ENVIRONMENTAL DATA	Bioaccumulation of this chemical may occur in seafood. 	

N O T E S

This is one of many polycyclic aromatic hydrocarbons - standards are usually established for them as mixtures, e.g., coal tar pitch volatiles. However, it may be encountered as a laboratory chemical in its pure form. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken. Do NOT take working clothes home. DBA is a commonly used name. This substance is one of many polycyclic aromatic hydrocarbons (PAH).

ADDITIONAL INFORMATION

ICSC: 0431 **DIBENZO(a,h)ANTHRACENE**

International Chemical Safety Cards

COAL-TAR PITCH

ICSC: 1415

Pitch

ICSC # 1415
CAS # 65996-93-2
RTECS # GF8655000
EC # 648-055-00-5
March 07, 2002 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Foam, dry powder, carbon dioxide.
EXPLOSION			
EXPOSURE		AVOID ALL CONTACT! PREVENT DISPERSION OF DUST!	
•INHALATION	Sneezing. Cough. See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.	Closed system and ventilation.	Fresh air, rest.
•SKIN	MAY BE ABSORBED! Redness. Burning sensation.	Protective gloves. Protective clothing.	Rinse and then wash skin with water and soap.
•EYES	Redness. Pain.	Safety goggles, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.	Do not eat, drink, or smoke during work. Wash hands before eating.	Give plenty of water to drink. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into sealable containers. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment. (Extra personal protection: A/P2 filter respirator for organic vapour and harmful dust.)	Separated from strong oxidants. Separated from food and feedstuffs	Do not transport with food and feedstuffs. Note: H T symbol R: 45 S: 53-45

SEE IMPORTANT INFORMATION ON BACK

ICSC: 1415

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

COAL-TAR PITCH

ICSC: 1415

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PHYSICAL STATE; APPEARANCE:
BLACK TO BROWN PASTE

PHYSICAL DANGERS:

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation and through the skin and by ingestion.

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration

O R T A N T D A T A	**CHEMICAL DANGERS:** The substance decomposes on heating above 400°C producing toxic fumes Reacts with strong oxidants **OCCUPATIONAL EXPOSURE LIMITS:** TLV: (as benzene soluble aerosol for coal tar pitch volatiles) 0.2 mg/m³ as TWA A1 (ACGIH 2001). OSHA PEL: TWA 0.2 mg/m^3 (benzene-soluble fraction) 1910.1002 See Appendix C NIOSH REL: Ca TWA 0.1 mg/m^3 (cyclohexane-extractable fraction) See Appendix A See Appendix C NIOSH IDLH: Ca 80 mg/m^3 See: 65996932 of airborne particles can, however, be reached quickly when dispersed and when heated. **EFFECTS OF SHORT-TERM EXPOSURE:** The substance is irritating to the eyes the skin and the respiratory tract **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** Repeated or prolonged contact with skin may cause dermatitis and hyperpigmentation of skin. This substance is carcinogenic to humans.
PHYSICAL PROPERTIES	Boiling point: >250°C Melting point: 30-180°C Density: >1 g/cm3 Solubility in water: at 20°C none Vapour pressure, kPa at 20°C: <0.01 Flash point: >200°C o.c. Auto-ignition temperature: >500°C Octanol/water partition coefficient as log Pow: 6.04
ENVIRONMENTAL DATA	This substance may be hazardous to the environment; special attention should be given to soil contamination and aquatic organisms. The substance may cause long-term effects in the aquatic environment. 

N O T E S

Depending on the degree of exposure, periodic medical examination is suggested.

NFPA Code: H0; F1; R0;

ADDITIONAL INFORMATION

ICSC: 1415 **COAL-TAR PITCH**

International Chemical Safety Cards

COAL-TAR PITCH

ICSC: 1415

Pitch

ICSC # 1415
CAS # 65996-93-2
RTECS # GF8655000
EC # 648-055-00-5
March 07, 2002 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Foam, dry powder, carbon dioxide.
EXPLOSION			
EXPOSURE		AVOID ALL CONTACT! PREVENT DISPERSION OF DUST!	
•INHALATION	Sneezing. Cough. See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.	Closed system and ventilation.	Fresh air, rest.
•SKIN	MAY BE ABSORBED! Redness. Burning sensation.	Protective gloves. Protective clothing.	Rinse and then wash skin with water and soap.
•EYES	Redness. Pain.	Safety goggles, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.	Do not eat, drink, or smoke during work. Wash hands before eating.	Give plenty of water to drink. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into sealable containers. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment. (Extra personal protection: A/P2 filter respirator for organic vapour and harmful dust.)	Separated from strong oxidants. Separated from food and feedstuffs	Do not transport with food and feedstuffs. Note: H T symbol R: 45 S: 53-45

SEE IMPORTANT INFORMATION ON BACK

ICSC: 1415

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

COAL-TAR PITCH

ICSC: 1415

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PHYSICAL STATE; APPEARANCE:
BLACK TO BROWN PASTE

PHYSICAL DANGERS:

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation and through the skin and by ingestion.

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration

O R T A N T D A T A	**CHEMICAL DANGERS:** The substance decomposes on heating above 400°C producing toxic fumes Reacts with strong oxidants **OCCUPATIONAL EXPOSURE LIMITS:** TLV: (as benzene soluble aerosol for coal tar pitch volatiles) 0.2 mg/m³ as TWA A1 (ACGIH 2001). OSHA PEL: TWA 0.2 mg/m^3 (benzene-soluble fraction) 1910.1002 See Appendix C NIOSH REL: Ca TWA 0.1 mg/m^3 (cyclohexane-extractable fraction) See Appendix A See Appendix C NIOSH IDLH: Ca 80 mg/m^3 See: 65996932 of airborne particles can, however, be reached quickly when dispersed and when heated. **EFFECTS OF SHORT-TERM EXPOSURE:** The substance is irritating to the eyes the skin and the respiratory tract **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** Repeated or prolonged contact with skin may cause dermatitis and hyperpigmentation of skin. This substance is carcinogenic to humans.
PHYSICAL PROPERTIES	Boiling point: >250°C Melting point: 30-180°C Density: >1 g/cm3 Solubility in water: at 20°C none Vapour pressure, kPa at 20°C: <0.01 Flash point: >200°C o.c. Auto-ignition temperature: >500°C Octanol/water partition coefficient as log Pow: 6.04
ENVIRONMENTAL DATA	This substance may be hazardous to the environment; special attention should be given to soil contamination and aquatic organisms. The substance may cause long-term effects in the aquatic environment. 

N O T E S

Depending on the degree of exposure, periodic medical examination is suggested.

NFPA Code: H0; F1; R0;

ADDITIONAL INFORMATION

ICSC: 1415 **COAL-TAR PITCH**

International Chemical Safety Cards

CHRYSENE

ICSC: 1672

Benzoaphenanthrene
1,2-Benzophenanthrene
1,2,5,6-Dibenzonaphthalene
$C_{18}H_{12}$
Molecular mass: 228.3

ICSC # 1672
CAS # 218-01-9
RTECS # GC0700000
UN # 3077
EC # 601-048-00-0
October 12, 2006 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Water spray. Dry powder. Foam. Carbon dioxide.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE	See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.	AVOID ALL CONTACT!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety goggles	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Personal protection: P3 filter respirator for toxic particles. Do NOT let this chemical enter the environment. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place.	Separated from strong oxidants, Provision to contain effluent from fire extinguishing. Store in an area without drain or sewer access.	T symbol N symbol R: 45-68-50/53 S: 53-45-60-61 UN Hazard Class: 9 UN Packing Group: III Signal: Warning Aqua-Cancer Suspected of causing cancer Very toxic to aquatic life with long lasting effects Very toxic to aquatic life

SEE IMPORTANT INFORMATION ON BACK

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European

International Chemical Safety Cards

CHRYSENE

ICSC: 1672

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
COLOURLESS TO BEIGE CRYSTALS OR POWDER

PHYSICAL DANGERS:
Dust explosion possible if in powder or granular form, mixed with air.

CHEMICAL DANGERS:
The substance decomposes on burning producing toxic fumes Reacts violently with strong oxidants

OCCUPATIONAL EXPOSURE LIMITS:
TLV: A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2006).
MAK not established.

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.

INHALATION RISK:
A harmful concentration of airborne particles can be reached quickly when dispersed

EFFECTS OF SHORT-TERM EXPOSURE:

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
This substance is possibly carcinogenic to humans.

PHYSICAL PROPERTIES

Boiling point: 448°C
Melting point: 254 - 256°C
Density: 1.3 g/cm³

Solubility in water:
very poor
Octanol/water partition coefficient as log Pow: 5.9

ENVIRONMENTAL DATA

The substance is very toxic to aquatic organisms. Bioaccumulation of this chemical may occur in seafood. It is strongly advised that this substance does not enter the environment.

NOTES

Depending on the degree of exposure, periodic medical examination is suggested. Do NOT take working clothes home. This substance does not usually occur as a pure substance but as a component of polyaromatic hydrocarbon (PAH) mixtures. Human population studies have associated PAH's exposure with cancer and cardiovascular diseases.

Transport Emergency Card: TEC (R)-90GM7-III

ADDITIONAL INFORMATION

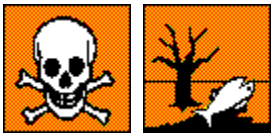
International Chemical Safety Cards

BENZO(b)FLUORANTHENE

ICSC: 0720

Benz(e)acephenanthrylene
2,3-Benzofluoroanthene
Benzo(e)fluoranthene
3,4-Benzofluoranthene
$C_{20}H_{12}$
Molecular mass: 252.3

ICSC # 0720
CAS # 205-99-2
RTECS # CU1400000
EC # 601-034-00-4
March 25, 1999 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE			In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			
EXPOSURE		AVOID ALL CONTACT!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety spectacles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.	Provision to contain effluent from fire extinguishing. Well closed.	T symbol N symbol R: 45-50/53 S: 53-45-60-61

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0720

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

BENZO(b)FLUORANTHENE

ICSC: 0720

I	**PHYSICAL STATE; APPEARANCE:** COLOURLESS CRYSTALS	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation

IMPORTANT DATA	**PHYSICAL DANGERS:** **CHEMICAL DANGERS:** Upon heating, toxic fumes are formed. **OCCUPATIONAL EXPOSURE LIMITS:** TLV: A2 (suspected human carcinogen); (ACGIH 2004). MAK: Carcinogen category: 2; (DFG 2004). of its aerosol and through the skin. **INHALATION RISK:** Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly. **EFFECTS OF SHORT-TERM EXPOSURE:** **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** This substance is possibly carcinogenic to humans. May cause genetic damage in humans.
PHYSICAL PROPERTIES	Boiling point: 481°C Melting point: 168°C Solubility in water: none Octanol/water partition coefficient as log Pow: 6.12
ENVIRONMENTAL DATA	This substance may be hazardous to the environment; special attention should be given to air quality and water quality. 

N O T E S

Benzo(b)fluoranthene is present as a component of polycyclic aromatic hydrocarbons (PAH) content in the environment usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco.ACGIH recommends environment containing benzo(b)fluoranthene should be evaluated in terms of the TLV-TWA for coal tar pitch volatile, as benzene soluble 0.2 mg/m^3. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.

ADDITIONAL INFORMATION

ICSC: 0720 **BENZO(b)FLUORANTHENE**

International Chemical Safety Cards

INDENO(1,2,3-cd)PYRENE

ICSC: 0730

o-Phenylenepyrene
2,3-Phenylenepyrene
$C_{22}H_{12}$
Molecular mass: 276.3

ICSC # 0730
CAS # 193-39-5
RTECS # NK9300000
March 25, 1999 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE			In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			
EXPOSURE		AVOID ALL CONTACT!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety spectacles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.	Provision to contain effluent from fire extinguishing. Well closed.	R: S:

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0730

International Chemical Safety Cards

INDENO(1,2,3-cd)PYRENE

ICSC: 0730

I **M** **P**	**PHYSICAL STATE; APPEARANCE:** YELLOW CRYSTALS **PHYSICAL DANGERS:**	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation of its aerosol and through the skin. **INHALATION RISK:**

O R T A N T D A T A	**CHEMICAL DANGERS:** Upon heating, toxic fumes are formed. **OCCUPATIONAL EXPOSURE LIMITS:** TLV not established. MAK: Carcinogen category: 2; (DFG 2004).	Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly. **EFFECTS OF SHORT-TERM EXPOSURE:** **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** This substance is possibly carcinogenic to humans.
PHYSICAL PROPERTIES	Boiling point: 536°C Melting point: 164°C Solubility in water: none	Octanol/water partition coefficient as log Pow: 6.58
ENVIRONMENTAL DATA	This substance may be hazardous to the environment; special attention should be given to air quality and water quality. Bioaccumulation of this chemical may occur in fish. 	

N O T E S

Indeno(1,2,3-cd)pyrene is present as a component of polycyclic aromatic hydrocarbons (PAH) content in the environment usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco.ACGIH recommends environment containing Indeno(1,2,3-c,d)pyrene should be evaluated in terms of the TLV-TWA for coal tar pitch volatile, as benzene soluble 0.2 mg/m^3. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.

ADDITIONAL INFORMATION

ICSC: 0730 **INDENO(1,2,3-cd)PYRENE**

International Chemical Safety Cards

DIBENZO(a,h)ANTHRACENE

ICSC: 0431

1,25,6-Dibenzanthracene
$C_{22}H_{14}$
Molecular mass: 278.4

ICSC # 0431
CAS # 53-70-3
RTECS # HN2625000
EC # 601-041-00-2
October 23, 1995 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Water spray, powder.
EXPLOSION			
EXPOSURE		AVOID ALL CONTACT!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN	Redness. Swelling. Itching.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness.	Face shield or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Personal protection: P3 filter respirator for toxic particles.	Well closed.	T symbol N symbol R: 45-50/53 S: 53-45-60-61

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0431

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

DIBENZO(a,h)ANTHRACENE

ICSC: 0431

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PHYSICAL STATE; APPEARANCE:
COLOURLESS CRYSTALLINE POWDER.

PHYSICAL DANGERS:

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration

R T A N T D A T A	**CHEMICAL DANGERS:** **OCCUPATIONAL EXPOSURE LIMITS:** TLV not established.	of airborne particles can, however, be reached quickly. **EFFECTS OF SHORT-TERM EXPOSURE:** **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** The substance may have effects on the skin , resulting in photosensitization. This substance is probably carcinogenic to humans.
PHYSICAL PROPERTIES	Boiling point: 524°C Melting point: 267°C Relative density (water = 1): 1.28	Solubility in water: none Octanol/water partition coefficient as log Pow: 6.5
ENVIRONMENTAL DATA	Bioaccumulation of this chemical may occur in seafood. 	

N O T E S

This is one of many polycyclic aromatic hydrocarbons - standards are usually established for them as mixtures, e.g., coal tar pitch volatiles. However, it may be encountered as a laboratory chemical in its pure form. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken. Do NOT take working clothes home. DBA is a commonly used name. This substance is one of many polycyclic aromatic hydrocarbons (PAH).

ADDITIONAL INFORMATION

ICSC: 0431 **DIBENZO(a,h)ANTHRACENE**

International Chemical Safety Cards

NAPHTHALENE

ICSC: 0667

Naphthene
$C_{10}H_8$
Molecular mass: 128.18

ICSC # 0667
CAS # 91-20-3
RTECS # QJ0525000
UN # 1334 (solid); 2304 (molten)
EC # 601-052-00-2
April 21, 2005 Peer reviewed


TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Powder, water spray, foam, carbon dioxide.
EXPLOSION	Above 80°C explosive vapour/air mixtures may be formed. Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		PREVENT DISPERSION OF DUST!	
•INHALATION	Headache. Weakness. Nausea. Vomiting. Sweating. Confusion. Jaundice. Dark urine.	Ventilation (not if powder), local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	MAY BE ABSORBED! (Further see Inhalation).	Protective gloves.	Rinse skin with plenty of water or shower.
•EYES		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. Diarrhoea. Convulsions. Unconsciousness. (Further see Inhalation).	Do not eat, drink, or smoke during work. Wash hands before eating.	Rest. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Personal protection: filter respirator for organic gases and vapours. Do NOT let this chemical enter the environment. Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place.	Separated from strong oxidants, food and feedstuffs Store in an area without drain or sewer access.	Do not transport with food and feedstuffs. Marine pollutant. Xn symbol N symbol R: 22-40-50/53 S: 2-36/37-46-60-61 UN Hazard Class: 4.1 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0667

International Chemical Safety Cards

NAPHTHALENE

ICSC: 0667

I M P O R T A N T D A T A

PHYSICAL STATE; APPEARANCE:
WHITE SOLID IN VARIOUS FORMS , WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:
Dust explosion possible if in powder or granular form, mixed with air.

CHEMICAL DANGERS:
On combustion, forms irritating and toxic gases. Reacts with strong oxidants

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 10 ppm as TWA 15 ppm as STEL (skin) A4 (not classifiable as a human carcinogen); (ACGIH 2005).
MAK: skin absorption (H);
Carcinogen category: 2; Germ cell mutagen group: 3B; (DFG 2004).
OSHA PEL†: TWA 10 ppm (50 mg/m^3)
NIOSH REL: TWA 10 ppm (50 mg/m^3) ST 15 ppm (75 mg/m^3)
NIOSH IDLH: 250 ppm See: 91203

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

INHALATION RISK:
A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C. See Notes.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance may cause effects on the blood , resulting in lesions of blood cells (haemolysis) See Notes. The effects may be delayed. Exposure by ingestion may result in death. Medical observation is indicated.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The substance may have effects on the blood , resulting in chronic haemolytic anaemia. The substance may have effects on the eyes , resulting in the development of cataract. This substance is possibly carcinogenic to humans.

PHYSICAL PROPERTIES

Boiling point: 218°C
Sublimation slowly at room temperature
Melting point: 80°C
Density: 1.16
g/cm3
Solubility in water, g/100 ml at 25°C:
none

Vapour pressure, Pa at 25°C: 11
Relative vapour density (air = 1): 4.42
Flash point:
80°C c.c.
Auto-ignition temperature: 540°C
Explosive limits, vol% in air: 0.9-5.9
Octanol/water partition coefficient as log Pow: 3.3

ENVIRONMENTAL DATA

The substance is very toxic to aquatic organisms. The substance may cause long-term effects in the aquatic environment.

N O T E S

Some individuals may be more sensitive to the effect of naphthalene on blood cells.

Transport Emergency Card: TEC (R)-41S1334 (solid); 41GF1-II+III (solid); 41S2304 (molten)
NFPA Code: H2; F2; R0;

ADDITIONAL INFORMATION

IMPORTANT LEGAL NOTICE:

BENZO(a)PYRENE

ICSC: 0104

Benz(a)pyrene
3,4-Benzopyrene
Benzo(d,e,f)chrysene
$C_{20}H_{12}$
Molecular mass: 252.3

ICSC # 0104
CAS # 50-32-8
RTECS # DJ3675000
EC # 601-032-00-3
October 17, 2005 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Water spray, foam, powder, carbon dioxide.
EXPLOSION			
EXPOSURE	See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.	AVOID ALL CONTACT! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN	MAY BE ABSORBED!	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety goggles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Personal protection: complete protective clothing including self-contained breathing apparatus. Do NOT let this chemical enter the environment. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place.	Separated from strong oxidants.	T symbol N symbol R: 45-46-60-61-43-50/53 S: 53-45-60-61

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0104

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

BENZO(a)PYRENE

ICSC: 0104

I M P O R T A N T D A T A

PHYSICAL STATE; APPEARANCE:
PALE-YELLOW CRYSTALS

PHYSICAL DANGERS:

CHEMICAL DANGERS:
Reacts with strong oxidants causing fire and explosion hazard.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: Exposure by all routes should be carefully controlled to levels as low as possible A2 (suspected human carcinogen); (ACGIH 2005).
MAK:
Carcinogen category: 2; Germ cell mutagen group: 2; (DFG 2005).

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.

EFFECTS OF SHORT-TERM EXPOSURE:

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
This substance is carcinogenic to humans. May cause heritable genetic damage to human germ cells. Animal tests show that this substance possibly causes toxicity to human reproduction or development.

PHYSICAL PROPERTIES

Boiling point: 496°C
Melting point: 178.1°C
Density: 1.4
g/cm³

Solubility in water: none (<0.1 g/100 ml)
Vapour pressure :
negligible
Octanol/water partition coefficient as log Pow: 6.04

ENVIRONMENTAL DATA

The substance is very toxic to aquatic organisms. Bioaccumulation of this chemical may occur in fish, in plants and in molluscs. The substance may cause long-term effects in the aquatic environment.

N O T E S

Do NOT take working clothes home. Benzo(a)pyrene is present as a component of polycyclic aromatic hydrocarbons (PAHs) in the environment, usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco.

ADDITIONAL INFORMATION

International Chemical Safety Cards

BARIUM SULFATE

ICSC: 0827

Barium sulphate
Blanc fixe
Artificial barite
$BaSO_4$
Molecular mass: 233.43

ICSC # 0827
CAS # 7727-43-7
RTECS # CR0600000
October 20, 1999 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			
EXPOSURE		PREVENT DISPERSION OF DUST!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
•EYES		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Personal protection: P1 filter respirator for inert particles.		R: S:

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0827

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

BARIUM SULFATE

ICSC: 0827

IMPORTANT DATA	**PHYSICAL STATE; APPEARANCE:** ODOURLESS TASTELESS, WHITE OR YELLOWISH CRYSTALS OR POWDER. **PHYSICAL DANGERS:** **CHEMICAL DANGERS:** Reacts violently with aluminium powder. **OCCUPATIONAL EXPOSURE LIMITS:** TLV: 10 mg/m³ as TWA; (ACGIH 2004). MAK: (Inhalable fraction) 4 mg/m³; (Respirable fraction) 1.5 mg/m³; (DFG 2004). OSHA PEL†: TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp) NIOSH REL: TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp) NIOSH IDLH: N.D. See: IDLH INDEX **ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation of its aerosol. **INHALATION RISK:** Evaporation at 20°C is negligible; a nuisance-causing concentration of airborne particles can, however, be reached quickly. **EFFECTS OF SHORT-TERM EXPOSURE:** **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** Lungs may be affected by repeated or prolonged exposure to dust particles , resulting in baritosis (a form of benign pneumoconiosis).
PHYSICAL PROPERTIES	Melting point (decomposes): 1600°C Density: 4.5 g/cm³ Solubility in water: none
ENVIRONMENTAL DATA	

NOTES

Occurs in nature as the mineral barite; also as barytes, heavy spar. Card has been partly updated in October 2005. See section Occupational Exposure Limits.

ADDITIONAL INFORMATION

International Chemical Safety Cards

COPPER

ICSC: 0240

Cu
(powder)

ICSC # 0240
CAS # 7440-50-8
RTECS # GL5325000
September 24, 1993 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Special powder, dry sand, NO other agents.
EXPLOSION			
EXPOSURE		PREVENT DISPERSION OF DUST!	
•INHALATION	Cough. Headache. Shortness of breath. Sore throat.	Local exhaust or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness. Pain.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. Nausea. Vomiting.	Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers. Carefully collect remainder. Then remove to safe place. (Extra personal protection: P2 filter respirator for harmful particles).	Separated from - See Chemical Dangers.	R: S:

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0240

International Chemical Safety Cards

COPPER

ICSC: 0240

I

M

P

PHYSICAL STATE; APPEARANCE:
RED POWDER, TURNS GREEN ON EXPOSURE TO MOIST AIR.

PHYSICAL DANGERS:

CHEMICAL DANGERS:

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation and by ingestion.

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.

O **R** **T** **A** **N** **T** **D** **A** **T** **A**	Shock-sensitive compounds are formed with acetylenic compounds, ethylene oxides and azides. Reacts with strong oxidants like chlorates, bromates and iodates, causing explosion hazard. **OCCUPATIONAL EXPOSURE LIMITS:** TLV: 0.2 mg/m³ fume (ACGIH 1992-1993). TLV (as Cu, dusts & mists): 1 mg/m³ (ACGIH 1992-1993). Intended change 0.1 mg/m³ Inhal., A4 (not classifiable as a human carcinogen); MAK: 0.1 mg/m³ (Inhalable fraction) Peak limitation category: II(2) Pregnancy risk group: D (DFG 2005). OSHA PEL*: TWA 1 mg/m^3 *Note: The PEL also applies to other copper compounds (as Cu) except copper fume. NIOSH REL*: TWA 1 mg/m^3 *Note: The REL also applies to other copper compounds (as Cu) except Copper fume. NIOSH IDLH: 100 mg/m^3 (as Cu) See: 7440508	**EFFECTS OF SHORT-TERM EXPOSURE:** Inhalation of fumes may cause metal fume fever. See Notes. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** Repeated or prolonged contact may cause skin sensitization.
PHYSICAL PROPERTIES	Boiling point: 2595°C Melting point: 1083°C Relative density (water = 1): 8.9	Solubility in water: none
ENVIRONMENTAL DATA		

N O T E S

The symptoms of metal fume fever do not become manifest until several hours.

ADDITIONAL INFORMATION

ICSC: 0240 **COPPER**

IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

LEAD

ICSC: 0052

Lead metal
Plumbum
Pb
Atomic mass: 207.2
(powder)

ICSC # 0052
CAS # 7439-92-1
RTECS # OF7525000
October 08, 2002 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE	See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.	PREVENT DISPERSION OF DUST! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. Nausea. Vomiting.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Give plenty of water to drink. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment. Personal protection: P3 filter respirator for toxic particles.	Separated from food and feedstuffs incompatible materials See Chemical Dangers.	R: S:

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0052

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

LEAD

ICSC: 0052

I M P O R T A N T D A T A

PHYSICAL STATE; APPEARANCE:
BLUISH-WHITE OR SILVERY-GREY SOLID IN VARIOUS FORMS. TURNS TARNISHED ON EXPOSURE TO AIR.

PHYSICAL DANGERS:
Dust explosion possible if in powder or granular form, mixed with air.

CHEMICAL DANGERS:
On heating, toxic fumes are formed. Reacts with oxidants. Reacts with hot concentrated nitric acid, boiling concentrated hydrochloric acid and sulfuric acid. Attacked by pure water and by weak organic acids in the presence of oxygen.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 0.05 mg/m³ A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued (ACGIH 2004).
MAK:
Carcinogen category: 3B; Germ cell mutagen group: 3A; (DFG 2004).
EU OEL: as TWA 0.15 mg/m³ (EU 2002).
OSHA PEL*: 1910.1025 TWA 0.050 mg/m^3 See Appendix C *Note: The PEL also applies to other lead compounds (as Pb) -- see Appendix C.
NIOSH REL*: TWA 0.050 mg/m^3 See Appendix C
*Note: The REL also applies to other lead compounds (as Pb) -- see Appendix C.
NIOSH IDLH: 100 mg/m^3 (as Pb) See: 7439921

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation and by ingestion.

INHALATION RISK:
A harmful concentration of airborne particles can be reached quickly when dispersed, especially if powdered.

EFFECTS OF SHORT-TERM EXPOSURE:

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The substance may have effects on the blood bone marrow central nervous system peripheral nervous system kidneys , resulting in anaemia, encephalopathy (e.g., convulsions), peripheral nerve disease, abdominal cramps and kidney impairment. Causes toxicity to human reproduction or development.

PHYSICAL PROPERTIES		
	Boiling point: 1740°C	Density: 11.34 g/cm3
	Melting point: 327.5°C	Solubility in water: none

ENVIRONMENTAL DATA	
	Bioaccumulation of this chemical may occur in plants and in mammals. It is strongly advised that this substance does not enter the environment. 

N O T E S

Depending on the degree of exposure, periodic medical examination is suggested. Do NOT take working clothes home.

Transport Emergency Card: TEC (R)-51S1872

ADDITIONAL INFORMATION

ICSC: 0052 **LEAD**

International Chemical Safety Cards

ZINC POWDER

ICSC: 1205

Blue powder
Merrillite
Zn
Atomic mass: 65.4
(powder)

ICSC # 1205
CAS # 7440-66-6
RTECS # ZG8600000
UN # 1436 (zinc powder or dust)
EC # 030-001-00-1
October 24, 1994 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Highly flammable. Many reactions may cause fire or explosion. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking. NO contact with acid(s), base (s) and incompatible substances (see Chemical Dangers).	Special powder, dry sand, NO other agents. NO water.
EXPLOSION	Risk of fire and explosion on contact with acid(s), base(s), water and incompatible substances.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Prevent build-up of electrostatic charges (e.g., by grounding). Prevent deposition of dust.	In case of fire: cool drums, etc., by spraying with water but avoid contact of the substance with water.
EXPOSURE		PREVENT DISPERSION OF DUST! STRICT HYGIENE!	
•**INHALATION**	Metallic taste and metal fume fever. Symptoms may be delayed (see Notes).	Local exhaust.	Fresh air, rest. Refer for medical attention.
•**SKIN**	Dry skin.	Protective gloves.	Rinse and then wash skin with water and soap.
•**EYES**		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•**INGESTION**	Abdominal pain. Nausea. Vomiting.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Extinguish or remove all ignition sources. Do NOT wash away into sewer. Sweep spilled substance into containers. then remove to safe place. Personal protection: self-contained breathing apparatus.	Fireproof. Separated from acids, bases oxidants Dry.	Airtight. F symbol N symbol R: 15-17-50/53 S: 2-7/8-43-46-60-61 UN Hazard Class: 4.3 UN Subsidiary Risks: 4.2

SEE IMPORTANT INFORMATION ON BACK

International Chemical Safety Cards

ZINC POWDER

ICSC: 1205

I M P O R T A N T D A T A

PHYSICAL STATE; APPEARANCE:
ODOURLESS GREY TO BLUE POWDER.

PHYSICAL DANGERS:
Dust explosion possible if in powder or granular form, mixed with air. If dry, it can be charged electrostatically by swirling, pneumatic transport, pouring, etc.

CHEMICAL DANGERS:
Upon heating, toxic fumes are formed. The substance is a strong reducing agent and reacts violently with oxidants. Reacts with water and reacts violently with acids and bases forming flammable/explosive gas (hydrogen - see ICSC0001) Reacts violently with sulfur, halogenated hydrocarbons and many other substances causing fire and explosion hazard.

OCCUPATIONAL EXPOSURE LIMITS:
TLV not established.

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation and by ingestion.

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.

EFFECTS OF SHORT-TERM EXPOSURE:
Inhalation of fumes may cause metal fume fever. The effects may be delayed.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
Repeated or prolonged contact with skin may cause dermatitis.

PHYSICAL PROPERTIES

Boiling point: 907°C
Melting point: 419°C
Relative density (water = 1): 7.14
Solubility in water: reaction
Vapour pressure, kPa at 487°C: 0.1
Auto-ignition temperature: 460°C

ENVIRONMENTAL DATA

N O T E S

Zinc may contain trace amounts of arsenic, when forming hydrogen, may also form toxic gas arsine (see ICSC 0001 and ICSC 0222). Reacts violently with fire extinguishing agents such as water, halons, foam and carbon dioxide. The symptoms of metal fume fever do not become manifest until several hours later. Rinse contaminated clothes (fire hazard) with plenty of water.

Transport Emergency Card: TEC (R)-43GWS-II+III
NFPA Code: H0; F1; R1;

ADDITIONAL INFORMATION

ICSC: 1205 **ZINC POWDER**

IMPORTANT LEGAL NOTICE:

APPENDIX D

HOSPITAL INFORMATION AND MAP

FIELD ACCIDENT REPORT

FIELD ACCIDENT REPORT

This report is to be filled out by the designated Site Safety Officer after EVERY accident.

PROJECT NAME _____ PROJECT. NO._____

Date of Accident _____ Time _____ Report By _____

Type of Accident (Check One):

( ) Vehicular ( ) Personal ( ) Property

Name of Injured _____ DOB or Age _____

How Long Employed _____

Names of Witnesses _____

_____

Description of Accident _____

_____

_____

Action Taken _____

_____

_____

Did the Injured Lose Any Time? _____ How Much (Days/Hrs.)? _____

Was Safety Equipment in Use at the Time of the Accident (Hard Hat, Safety Glasses, Gloves, Safety Shoes, etc.)? _____

_____

(If not, it is the EMPLOYEE'S sole responsibility to process his/her claim through his/her Health and Welfare Fund.)

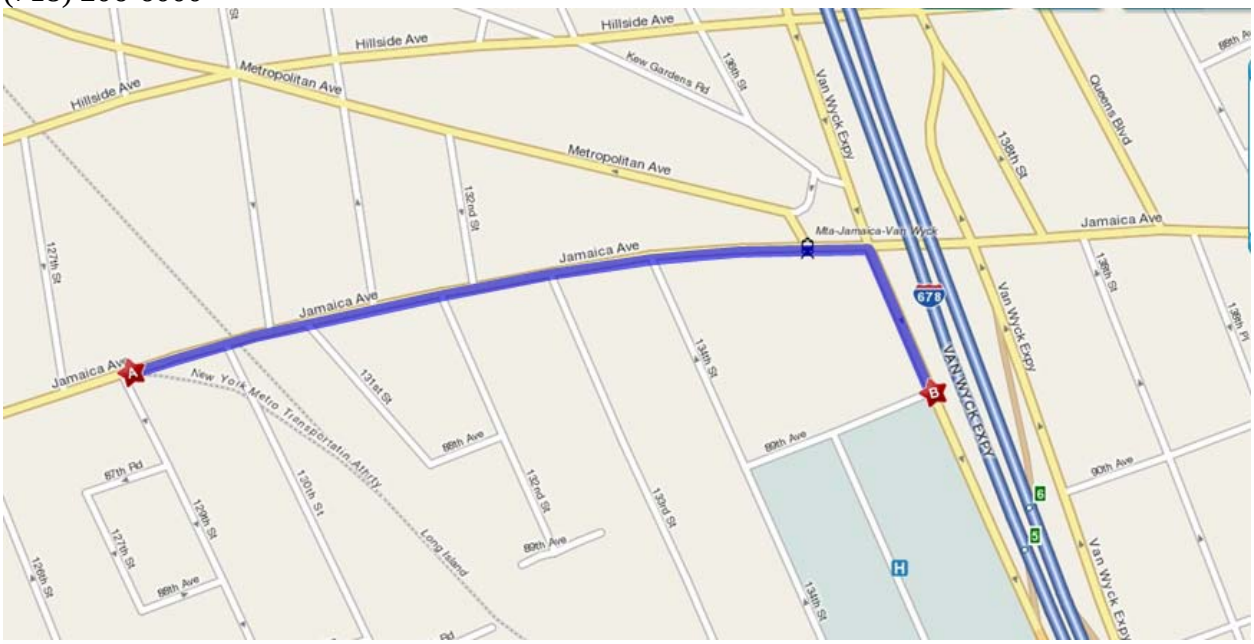
INDICATE STREET NAMES, DESCRIPTION OF VEHICLES, AND NORTH ARROW

HOSPITAL INFORMATION AND MAP

The hospital nearest the site is:

Distance: 0.4 miles **Approximate Travel Time:** 2 min

Jamaica Hospital Medical Center
8900 Van Wyck Expressway
Jamaica (Queens), New York 11418
(718) 206-6000



START	1. Start out going EAST on JAMAICA AVE toward 130TH ST.	0.3 mi
	2. Turn RIGHT onto VAN WYCK EXPY.	0.1 mi
END	3. 8900 VAN WYCK EXPY.	

ATTACHMENT C
QUALITY ASSURANCE PROJECT PLAN

QUALITY ASSURANCE PROJECT PLAN
Former Uniforms for Industry Site
129-09 Jamaica Avenue, Richmond Hill NY

Prepared on behalf of:

UNION JAMAICA LLC
15 Verbena Avenue, Suite #100
Floral Park, NY 11001-2711

Prepared by:

ENVIRONMENTAL BUSINESS CONSULTANTS
1808 Middle Country Road
Ridge, NY 11961

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QUALITY ASSURANCE PROJECT PLAN
Former Uniforms for Industry Site
129-09 Jamaica Avenue, Richmond Hill NY

TABLES

1.0 INTRODUCTION

To ensure the successful completion of the project. each individual responsible for a given component of the project must be aware of the quality assurance objectives of his / her particular work and of the overall project. The EBC Project Director, Charles Sosik will be directly responsible to the client for the overall project conduct and quality assurance/quality control (QAIQC) for the project. The project manager will be responsible for overseeing all technical and administrative aspects of the project and for directing QA/QC activities.

Reporting directly to the project manager will be the Field Operations Officer, Kevin Brussee; who will also serve as the laboratory coordinator and Health & Safety Officer (HSO). The HSO will be responsible for overseeing all health and safety aspects of the project.

1.1 Organization

Project QA will be maintained under the direction of the Project Manager, in accordance with this QAPP. QC for specific tasks will be the responsibility of the individuals and organizations listed below, under the direction and coordination of the Project Manager

.

GENERAL RESPONSIBILITY	SCOPE OF WORK	RESPONSIBILITY OF QUALITY CONTROL
Field Operations	Supervision of Field Crew, end-point verification sampling	Kevin Brussee
Laboratory Analysis	Analysis of soil samples by NYSDEC ASP methods Laboratory	NYSDOH-Certified Laboratory
Data review	Review for completeness and compliance	3rd party validation

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2.0 QUALITY ASSURANCE PROJECT PLAN OBJECTIVES

2.1 Overview

Overall project goals are defined through the development of Data Quality Objectives (DQOs), which are qualitative and quantitative Statements that specify the quality of the data required to support decisions; DQOs, as described in this section, are based on the end uses of the data as described in the work plan.

In this plan, Quality Assurance and Quality Control are defined as follows:

- Quality Assurance - The overall integrated program for assuring reliability of monitoring and measurement data.

- Quality Control - The routine application of procedures for obtaining prescribed standards of performance in the monitoring and measurement process.

2.2 QA / QC Requirements For Analytical Laboratory

Samples will be analyzed by a New York State Department of Health (NYSDOH) certified laboratory. Data generated from the laboratory will be used primarily to evaluate off-site contaminant levels of PCE and known break-down products. The QA requirements for all subcontracted analytical laboratory work performed on this project are described below. QA elements to be evaluated include accuracy, precision, sensitivity, representativeness, and completeness. The data generated by the analytical laboratory for this project are required to be sensitive enough to achieve detection levels low enough to meet required quantification limits as specified in NYSDEC Analytical Services Protocol (NYSDEC ASP, 06/2000. The analytical results meeting the required quantification limits will provide data sensitive enough to meet the data quality objectives of this remedial program as described in the work plan. Reporting of the data must be clear, concise, and comprehensive. The QC elements that are important to this project are completeness of field data, sample custody, sample holding times, sample preservation, sample storage, instrument calibration and blank contamination.

2.2.1 Instrument Calibration

Calibration curves will be developed for each of the compounds to be analyzed. Standard concentrations and a blank will be used to produce the initial curves. The development of calibration curves and initial calibration response factors must be consistent with method requirements presented in the most recent version of NYSDEC ASP (06/2000).

2.2.2 Continuing Instrument Calibration

The initial calibration curve will be verified every 12 hrs by analyzing one calibration standard. The standard concentration will be the midpoint concentration of the initial calibration curve. The calibration check compound must come within 25% relative percent difference (RPD) of the average response factor obtained during initial calibration. If the RPD is greater than 25%, then corrective action must be taken as provided in the specific methodology.

2.2.3 Method Blanks

Method blank or preparation blank is prepared from an analyte·free matrix which includes the same reagents, internal standards and surrogate standards as me related samples. II is carried through the entire sample preparation and analytical procedure. A method blank analysis will be performed once

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for each 12 hr period during the analysis of samples for volatiles. An acceptable method blank will contain less than five (5) times the CRQL of methylene chloride, acetone and 2-butanone. For all other target compounds, the method blank must contain less than or equal to the CRQL of any single target compound. For non-target peaks in the method blank, the peak area must be less than 10 percent of the nearest internal standard. The method blank will be used to demonstrate the level of laboratory background and reagent contamination that might result from the analytical process itself.

2.2.4 Trip Blanks.

Trip blanks consist of a single set of sample containers filled at the laboratory with deionized. laboratory-grade water. The water used will be from the same source as that used for the laboratory method blank. The containers will be carried into the field and handled and transported in the same way as the samples collected that day. Analysis of the trip blank for VOCs is used to identify contamination from the air, shipping containers, or from other items coming in contact with the sample bottles. (The bottles holding the trip blanks will be not opened during this procedure.) A complete set of trip blanks will be provided with each shipment of samples to the certified laboratory.

2.2.5 Surrogate Spike Analysis

For organic analyses, all samples and blanks will be spiked with surrogate compounds before purging or extraction in order to monitor preparation and analyses of samples. Surrogate spike recoveries shall fall within the advisory limits in accordance with the NY5DEC ASP protocols for samples falling within the quantification limits without dilution.

2.2.6 Matrix Spike / Matrix Spike Duplicate / Matrix Spike Blank (MS/MSDIMSB) Analysis

MS, MSD and MSB analyses will be performed to evaluate the matrix effect of the sample upon the analytical methodology along with the precision of the instrument by measuring recoveries. The MS / MSD / MSB samples will be analyzed for each group of samples of a similar matrix at a rate of one for every 20 field samples. The RPD will be calculated from the difference between the MS and MSD. Matrix spike blank analysis will be performed to indicate the appropriateness of the spiking solution(s) used for the MS/MSD.

2.3 Accuracy

Accuracy is defined as the nearness of a real or the mean (x) of a set of results to the true value. Accuracy is assessed by means of reference samples and percent recoveries. Accuracy includes both precision and recovery and is expressed as percent recovery (% REC). The MS sample is used to determine the percent recovery. The matrix spike percent recovery (% REC) is calculated by the following equation:

$$\%REC = \frac{SSR - SR}{SA} \times 100$$

Where:
SSR = spike sample results
SR = sample results
SA = spike added from spiking mix

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2.4 Precision

Precision is defined as the measurement of agreement of a set of replicate results among themselves without a Precision is defined as the measurement of agreement of a set of replicate results among themselves without assumption of any prior information as to the true result. Precision is assessed by means of duplicate/replicate sample analyses.

Analytical precision is expressed in terms of RPD. The RPD is calculated using the following formula:

$$RPD = \frac{D^1 - D^2}{(D^1 - D^2)/2} \times 100$$

Where:
RPD = relative percent difference
D^1 = first sample value
D^2 = second sample value (duplicate)

2.5 Sensitivity

The sensitivity objectives for this plan require that data generated by the analytical laboratory achieve quantification levels low enough to meet the required detection limits specified by NYSDEC ASP and to meet all site-specific standards, criteria and guidance values (SGCs) established for this project.

2.6 Representativeness

Representativeness is a measure of the relationship of an individual sample taken from a particular site to the remainder of that site and the relationship of a small aliquot of the sample (i.e., the one used in the actual analysis) to the sample remaining on site. The representativeness of samples is assured by adherence to sampling procedures described in the Investigative Work Plan.

2.7 Completeness

Completeness is a measure of the quantity of data obtained from a measurement system as compared to the amount of data expected from the measurement system. Completeness is defined as the percentage of all results that are not affected by failing QC qualifiers, and should be between 70 and 100% of all analyses performed. The objective of completeness in laboratory reporting is to provide a thorough data support package. The laboratory data package provides documentation of sample analysis and results in the form of summaries, QC data, and raw analytical data. The laboratory will be required to submit data packages that follow NYSDEC ASP reporting format which, at a minimum, will include the following components:

1. All sample chain-of-custody forms.
2. The case narrative(s) presenting a discussion of any problems and/or procedural changes required during analyses. Also presented in the case narrative are sample summary forms.
3. Documentation demonstrating the laboratory's ability to attain the contract specified detection limits for all target analytes in all required matrices.
4. Tabulated target compound results and tentatively identified compounds.
5. Surrogate spike analysis results (organics).
6. Matrix spike/matrix spike duplicate/matrix spike blank results.
7. QC check sample and standard recovery results
8. Blank results (field, trip, and method).
9. Internal standard area and RT summary.

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2.8 Laboratory Custody Procedures

The following elements are important for maintaining the field custody of samples:

- Sample identification
- Sample labels
- Custody records
- Shipping records
- Packaging procedures

Sample labels will be attached to all sampling bottles before field activities begin; each label will contain an identifying number. Each number will have a suffix that identifies the site and where the sample was taken. Approximate sampling locations will be marked on a map with a description of the sample location. The number, type of sample, and sample identification will be entered into the field logbook. A chain-of-custody form, initiated at the analytical laboratory will accompany the sample bottles from the laboratory into the field. Upon receipt of the bottles and cooler, the sampler will sign and date the first received blank space. After each sample is collected and appropriately identified, entries will be made on the chain-of-custody form that will include:

- Site name and address
- Samplers' names and signatures

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3.0 ANALYTICAL PROCEDURES

3.1 Laboratory Analysis

Samples will be analyzed by the NYSDEC ASP laboratory for one or more of the following parameters: VOCs in soil by USEPA Method 8260, SVOCs in soil by USEPA Method 8270BN, Target Analyte Metals in soil, pesticides and PCBs by USEPA Method 8081/8082 and VOCs in air by USEPA Method TO15. If any modifications or additions to the standard procedures are anticipated. and if any nonstandard sample preparation or analytical protocol is to be used, the modifications and the nonstandard protocol will be explicitly defined and documented. Prior approval by EBC's PM will be necessary for any nonstandard analytical or sample preparation protocol used by the laboratory, i.e., dilution of samples or extracts by greater than a factor of five (5).

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4.0 DATA REDUCTION, REVIEW, AND REPORTING

4.1 Overview

The process of data reduction, review, and reporting ensures the assessments or a conclusion based on the final data accurately reflects actual site conditions. This plan presents the specific procedures, methods, and format that will be employed for data reduction, review and reporting of each measurement parameter determined in the laboratory and field. Also described in this section is the process by which all data, reports, and work plans are proofed and checked for technical and numerical errors prior to final submission.

4.2 Data Reduction

Standard methods and references will be used as guidelines for data handling, reduction, validation, and reporting. All data for the project will be compiled and summarized with an independent verification at each step in the process to prevent transcription/typographical errors. Any computerized entry of data will also undergo verification review.

All data generated by the off-site laboratory will be reported in a specified format containing all required elements to perform data validation. Analytical results shall be presented on standard NYSDEC ASP-B forms or equivalents, and include the dates the samples were received and analyzed, and the actual methodology used. Laboratory QA/QC information required by the method protocols will be compiled, including the application of data QA/QC qualifiers as appropriate. In addition, laboratory worksheets, laboratory notebooks, chains-of-custody, instrument logs, standards records, calibration records, and maintenance records, as applicable, will be provided in the laboratory data packages to determine the validity of data. Specifics on internal laboratory data reduction protocols are identified in the laboratory's SOPs.

Following receipt of the laboratory analytical results by EBC, the data results will be compiled and presented in an appropriate tabular form. Where appropriate, the impacts of QA/QC qualifiers resulting from laboratory or external validation reviews will be assessed in terms of data usability.

4.3 Laboratory Data Reporting

All sample data packages submitted by the analytical laboratory will be required to be reported in conformance to the NYSDEC ASP (6/2000), Category B data deliverable requirements as applicable to the method utilized.

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5.0 CORRECTIVE ACTION

Review and implementation of systems and procedures may result in recommendations for corrective action. Any deviations from the specified procedures within approved project plans due to unexpected site-specific conditions shall warrant corrective action. All errors, deficiencies, or other problems shall be brought to the immediate attention of the EBC PM, who in turn shall contact the Quality Assurance/Data Quality Manager or his designee (if applicable).

Procedures have been established to ensure that conditions adverse to data quality are promptly investigated, evaluated and corrected. These procedures for review and implementation of a change are as follows:

- Define the problem.
- Investigate the cause of the problem.
- Develop a corrective action to eliminate the problem, in consultation with the personnel who defined the problem and who will implement the change.
- Complete the required form describing the change and its rationale (see below for form requirements).
- Obtain all required written approvals.
- Implement the corrective action.
- Verify that the change has eliminated the problem.

During the field investigation, all changes to the sampling program will be documented in field logs/sheets and the EBC PM advised.

If any problems occur with the laboratory or analyses, the laboratory must immediately notify the PM, who will consult with other project staff. All approved corrective actions shall be controlled and documented.

All corrective action documentation shall include an explanation of the problem and a proposed solution which will be maintained in the project file or associated logs. Each report must be approved by the necessary personnel (e.g., the PM) before implementation of the change occurs. The PM shall be responsible for controlling, tracking, implementing and distributing identified changes.

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TABLE 1
SUMMARY OF
SAMPLING PROGRAM RATIONALE AND ANALYSIS

Matrix	Location	Approximate Number of Samples	Frequency	Rationale for Sampling	Laboratory Analysis	Duplicates	Matrix Spikes	Spike Duplicates	Trip Blanks
Soil	Excavation Sidewalls	13	1 per 30 linear feet	Endpoint verification	VOCs by 8260	1 per day	1 per 20 samples	1 per 20 samples	0
Soil	Excavation Bottom	3	1 per 900 square feet	Endpoint verification	VOCs by 8260	1 per day	1 per 20 samples	1 per 20 samples	0
Soil	Hot Spot Stockpiles	1	1 per 1,000 cy	Waste Characterization	VOCs EPA Method 8260B, pesticides and PCBs by EPA 8081/8082, other	0	0	0	0
Soil	Historic Fill	2	1 per 1,000 cy	Waste Characterization	VOCs EPA Method 8260B, pesticides and PCBs by EPA 8081/8082, other	0	0	0	0
Soil	Clean Native Soil	38	1 per 500 cy	Verify Clean	VOCs EPA Method 8260B, pesticides and PCBs by EPA 8081/8082, other	0	0	0	0

TABLE 2
SAMPLE COLLECTION AND ANALYSIS PROTOCOLS

Sample Type	Matrix	Sampling Device	Parameter	Sample Container	Sample Preservation	Analytical Method#	CRQL / MDLH	Holding Time
Soil	Soil	Scoop Direct into Jar	VOCs	(1) 2 oz Jar	Cool to 4^{o} C	EPA Method 8260	Compound specific (1-5 ug/kg)	14 days
			SVOCs	(1) 8 oz jar	Cool to 4^{o} C	EPA Method 8260 BN	Compound specific (1-5 ug/kg)	14 day ext/40 days
			Pest/PCBs	from 8oz jar above	Cool to 4^{o} C	EPA Method 8081/8082	Compound specific (1-5 ug/kg)	14 day ext/40 days
			Metals	from above	Cool to 4^{o} C	TAL Metals	Compound specific (01-1 mg/kg)	6 months

Notes:
All holding times listed are from Verified Time of Sample Receipt (VTSR) unless noted otherwise. * Holding time listed is from time of sample collection.
The number in parentheses in the "Sample Container" column denotes the number of containers needed.
Triple volume required when collected MS/MSD samples
The number of trip blanks are estimated.
CRQL / MDL = Contract Required Quantitation Limit / Method Detection Limit.
MCAWW = Methods for Chemical Analysis of Water and Wastes.
NA = Not available or not applicable.

ATTACHMENT D
COMMUNITY AIR MONITORING PLAN

NEW YORK STATE BROWNFIELDS CLEANUP PROGRAM
BCP ID No. C241103

COMMUNITY AIR MONITORING PLAN

FORMER UNIFPRMS FOR INDUSTRY SITE
OPERABLE UNIT 1
129-09 JAMAICA AVENUE
RICHMOND HILL, NY

DECEMBER - 2010

FORMER UNIFPRMS FOR INDUSTRY SITE
OPERABLE UNIT 1

COMMUNITY AIR MONITORING PLAN
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APPENDICES

1.0 INTRODUCTION

This Community Air Monitoring Plan (CAMP) has been prepared for soil excavation activities associated with the implementation of a Remedial Action Work Plan (RAWP) at the Former Uniforms for Industry Site. The CAMP provides measures for protection for the downwind community (i.e., off-site receptors including residences, businesses, and on-site workers not directly involved in the remedial work) from potential airborne contaminant releases resulting from remedial activities at the site.

Compliance with this CAMP is required during all activities associated with soil excavation that have the potential to generate airborne particulate matter and volatile organic compounds (VOCs). These activities include excavation of soils, stockpiling, loading, and backfilling. This CAMP has been prepared to ensure that remediation activities do not adversely affect passersby, residents, or workers in the area immediately surrounding the Site and to preclude or minimize airborne migration of construction-related contaminants to offsite areas.

1.1 Regulatory Requirements

This CAMP was established in accordance with the following requirements:

- New York State Department of Health's (NYSDOH) Generic Community Air Monitoring Plan as presented in DER-10 Technical Guidance for Site Investigation and Remediation (NYSDEC November 2009). This guidance specifies that a community air-monitoring program shall be implemented to protect the surrounding community and to confirm that the work does not spread contamination off-site through the air;

- New York State Department of Environmental Conservation (NYSDEC) Technical and Guidance Memorandum (TAGM) #4031 - Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites: This guidance provides a basis for developing and implementing a fugitive dust suppression and particulate monitoring program as an element of a hazardous waste site's health and safety program.

2.0 AIR MONITORING

VOCs and metals are the constituents of concern at the Site. The appropriate method to monitor air for these constituents during remediation activities is through real-time VOC and air particulate (dust) monitoring.

2.1 Meteorological Data

At a minimum, wind direction will be evaluated at the start of each workday, noon of each workday, and the end of each workday. These readings will be utilized to position the monitoring equipment in appropriate upwind and downwind locations.

2.2 Community Air Monitoring Requirements

To establish ambient air background concentrations, air will be monitored at several locations around the site perimeter before construction activities begin. These points will be monitored periodically in series during the site work. When the excavation area is within 20 feet of potentially exposed populations or occupied structures, the perimeter monitoring points will be located to represent the nearest potentially exposed individuals at the downwind location.

Fugitive respirable dust will be monitored using a MiniRam Model PDM-3 aerosol monitor (or equivalent). Air will be monitored for VOCs with a portable Ionscience 3000 photoionization detector (PID), or equivalent. All air monitoring data will be documented in a site log book by the designated site safety officer. The site safety officer or delegate must ensure that air monitoring instruments are calibrated and maintained in accordance with manufacturer's specifications. All instruments will be zeroed daily and checked for accuracy. A daily log will be kept. If additional monitoring is required, the protocols will be developed and appended to this plan

3.0 VOC MONITORING, RESPONSE LEVELS, AND ACTIONS

Volatile organic compounds (VOCs) will be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present.

The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

- 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.

- 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.

- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown. All 15-minute readings must be recorded and be available for State (DEC and DOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

All readings will be recorded and made available for NYSDEC and NYSDOH personnel to review. If an exceedance of the Action Limits occurs, an Action Limit Report, as shown in Appendix A, will be completed.

3.1 Potential Corrective Measures and VOC Suppression Techniques

If the 15-minute integrated VOC level at the downwind location persists at a concentration that exceeds the upwind level by more than 5 ppm but less than 25 ppm during remediation activities, then vapor suppression techniques will be employed. The following techniques, or others, may be employed to mitigate the generation and migration of fugitive organic vapors:

- limiting the excavation size;
- backfilling the excavation;
- spraying water onto the excavation faces and equipment;
- covering soil stockpiles with 6-mil plastic sheeting;
- hauling waste materials in properly tarped containers; and/or
- applying vapor suppressant foam.

4.0 PARTICULATE MONITORING

Air monitoring for particulates (i.e., dust) will be performed continuously during remediation activities using both air monitoring equipment and visual observation at upwind and downwind locations. Monitoring equipment capable of measuring particulate matter smaller than 10 microns (PM_{10}) and capable of integrating (averaging) over periods of 15 minutes or less will be set up at upwind (i.e., background) and downwind locations, at heights approximately four to five feet above land surface (i.e., the breathing zone). Monitoring equipment will be MIE Data Ram monitors, or equivalent. The audible alarm on the particulate monitoring device will be set at 90 micrograms per cubic meter ($\mu g/m_3$). This setting will allow proactive evaluation of worksite conditions prior to reaching the action level of 100 $\mu g/m^3$ above background. The monitors will be calibrated at least once per day prior to work activities and recalibrated as needed thereafter. In addition, fugitive dust migration will be visually assessed during all intrusive work activities.

The following summarizes particulate action levels and the appropriate responses:

- If the downwind PM-10 particulate level is 100 $\mu g/m^3$ greater than background (upwind perimeter) for the 15-minute period, or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 $\mu g/m^3$ above the upwind level and provided that no visible dust is migrating from the work area.

- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 $\mu g/m^3$ above the upwind level, work must be stopped and an evaluation of activities initiated. Work can resume provided that dust suppression measures (as described in Section 2.3.1 below) and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 $\mu g/m^3$ of the upwind level and in preventing visible dust migration.

All readings will be recorded and be available for NYSDEC and NYSDOH personnel to review. If an exceedance of the Action Limits occurs, an Action Limit Report as shown in **Appendix A** will be completed.

4.1 Potential Particulate Suppression Techniques

If the integrated particulate level at the downwind location exceeds the upwind level by more than 100 $\mu g/m_3$ at any time during remediation activities, then dust suppression techniques will be employed. The following techniques, or others, may be employed to mitigate the generation and migration of fugitive dusts:

- limiting the excavation size;
- backfilling the excavation;
- spraying water onto the excavation faces and equipment;
- covering soil stockpiles with 8-mil plastic sheeting;
- hauling waste materials in properly tarped containers; and/or
- limiting vehicle speeds onsite.

Work may continue with dust suppression techniques provided that downwind PM_{10} levels are not more than 150 µg/m^3 greater than the upwind levels.

There may also be situations where the dust is generated by remediation activities and migrates to downwind locations, but is not detected by the monitoring equipment at or above the action level. Therefore, if dust is observed leaving the working area, dust suppression techniques such as those listed above will be employed.

If dust suppression techniques do not lower particulates to below 150 µg/m^3, or visible dust persists, work will be suspended until appropriate corrective measures are identified and implemented to remedy the situation.

All air monitoring readings will be recorded in the field logbook and will be available for the NYSDEC and NYSDOH personnel to review.

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5.0 DATA QUALITY ASSURANCE

5.1 Calibration

Instrument calibration shall be documented on instrument calibration and maintenance sheets or in the designated field logbook. All instruments shall be calibrated as required by the manufacturer. Calibration checks may be used during the day to confirm instrument accuracy. Duplicate readings may be taken to confirm individual instrument response.

5.2 Operations

All instruments shall be operated in accordance with the manufacturer's specifications. Manufacturers' literature, including an operations manual for each piece of monitoring equipment will be maintained on-site by the SSO for reference.

5.3 Data Review

The SSO will interpret all monitoring data based the established criteria and his/her professional judgment. The SSO shall review the data with the PM to evaluate the potential for worker exposure, upgrades/downgrades in level of protection, comparison to direct reading instrumentation and changes in the integrated monitoring strategy.

Monitoring and sampling data, along with all sample documentation will be periodically reviewed by the PM.

6.0 RECORDS AND REPORTING

All air readings must be recorded on daily air monitoring log sheets and made available for review by personnel from NYSDEC and NYSDOH.

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CAMP
ACTION LIMIT REPORT

Project Location: _____

Date: _____ Time: _____

Name: _____

Contaminant: _____ PM-10: _____ VOC: _____

Wind Speed: _____ Wind Direction: _____

Temperature: _____ Barometric Pressure: _____

DOWNWIND DATA

Monitor ID #: _____ Location: _____ Level Reported: _____

Monitor ID#: _____ Location: _____ Level Reported: _____

UPWIND DATA

Monitor ID #: _____ Location: _____ Level Reported: _____

Monitor ID#: _____ Location: _____ Level Reported: _____

BACKGROUND CORRECTED LEVELS

Monitor ID #: Location: _____ Level Reported: Level Reported: _____

ACTIONS TAKEN

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ATTACHMENT E
RESUMES OF KEY PERSONNEL

EBC

ENVIRONMENTAL BUSINESSS CONSULTANTS

Charles B. Sosik, PG, PHG, Principal

Professional Experience

21 years

Education

MS, Hydrogeology, Adelphi University, NY
BS, Geology, Northern Arizona University, AZ

Areas of Expertise

- Brownfields
- Hazardous Waste Site Investigations
- Pre-purchase Site Evaluations and Support
- Regulatory Negotiations
- Strategic Planning
- Real Estate Transactions
- NYC "E" Designations

Professional Certification

- Professional Geologist, NH
- Professional Hydrogeologist, WA
- Licensed Site Professional (LSP), MA (in progress)
- OSHA 40-hr HAZMAT
- OSHA 8-hr. Supervisor

Professional Affiliation / Committees

- NYS Council of Professional Geologists (NYSCPG)
- Association of Groundwater Scientists & Engineers (AGSE)
- NYS RBCA Advisory Committee
- Massachusetts LSP Association
- New Hampshire Association of Professional Geologists
- Interstate Technology Regulatory Council/MTBE Team
- Environmental Business Association, Brownfields Task Force
- Part 375 Working Group

PROFILE

Mr. Sosik has 21 years of experience in contaminant release management. He specializes in advising clients on managing environmental compliance with federal, state, and municipal agencies and has successfully directed numerous investigation and remediation projects involving petroleum, pesticides, chlorinated solvents, heavy metals and radiologically activated media. His work included extensive three-dimensional investigations on MTBE, which have been used effectively to help shape public policy. He also has experience in applying models to groundwater related problems and has completed several large-scale projects to determine fate and transport of contaminants, establish spill scenarios, and closure criteria. His experience and expertise in the area of contaminant hydrogeology has resulted in requests from environmental attorneys, property owners and New York State to serve as an expert witness and technical advisor on a variety of legal disputes.

For the past 10 years Mr. Sosik has been primarily engaged in providing environmental consulting to developers responding to the extensive re-zoning of former industrial and commercial properties, which is currently taking place throughout New York City. These services include everything from pre-purchase evaluations and contract negotiations to gaining acceptance in and moving projects through the NYS Brownfields Program. Mr. Sosik has taken a pro-active role in the continued development of the NYS Brownfields Program and related policy, by attending numerous working seminars, active participation in work groups and task forces and by providing commentary to draft versions of new guidance documents. Throughout his professional career, Mr. Sosik has remained committed to developing innovative cost- efficient solutions to environmental issues, specifically tailored to the needs of his clients.

SELECTED PROJECTS

Scavenger Waste Treatment Facility (SWTF), Suffolk County, NY

Water Treatment Plant EIS - Focused EIS - In response to requests from the Suffolk County Council on Environmental Quality and the Brookhaven Conservation Advisory Council, Mr. Sosik prepared a focused EIS to evaluate the potential impacts to an important surface water resource from the proposed facility including cumulative and synergistic effects with established contaminant plumes in the area.

Advanced Residential Communities, Rockville Centre, NY

Brownfield Project – As the senior project manager on this large scale, high profile redevelopment project, Mr. Sosik was asked to develop a plan to accelerate the regulatory process in the face of general community opposition. Through numerous discussions with the BCP management team, He was able to condense the schedule and review period, through the submission of supporting documents (Investigation Report, Remedial Work Plan) with the BCP application package. Community opposition, which focused on the environmental condition of the site as a means to block the project, was used to advantage in expediting approval of the aggressive interim remedial plan. This will allow the developer to begin remedial work approximately 5 months ahead of schedule.

Former Temco Uniform site, West Haverstraw, NY

Brownfield Project – Mr. Sosik took over management of this project from another consultant following transition of this VCP site to the BCP. Mr. Sosik used the opportunity to renegotiate and revise the scope of work to allow a more cost effective and focused investigation plan without re-writing or resubmitting the RIWP. During the NYSDEC's review of the transition package, he met with and coordinated changes with the NYSDEC Project Manager to gain approval. The result saved the client a significant amount of money, but perhaps more importantly in this case, did so without loss of time.

Grovick Properties, Jackson Heights, NY

Brownfield Project – This Brownfield property is somewhat unique in that it had been investigated and partially remediated by the NYSDEC through the petroleum spill fund. The client was interested in purchasing the property and redeveloping it as office and retail space. Mr. Sosik reviewed the NYSDEC investigation and developed a

Charles B. Sosik, PG, PHG, Principal

supplemental plan to meet the requirements of an RI under the BCP program. By performing this limited amount of field work "up-front" he was able to complete an RI Report and Remedial Plan and submit both with the BCP application package. The NYSDEC and NYSDOH approved the RI Report and the Remedial Plan with minor changes. This cut 120 days from the review process and allowed the client to arrange financing and move his project forward knowing what the clean-up costs would be at the outset.

Metro Management, Bronx, NY

Brownfield Project – The site of a former gas station, the developer had planned to construct a 12-story affordable housing apartment complex with first floor retail space. Since the site was located in an Environmental zone, potential tax credits of 22% for site development, remediation and tangible property could be realized under the BCP. In a pre-application meeting with the NYSDEC, Mr. Sosik realized that the department did not believe the site was eligible for the BCP, since it had been previously investigated and closed under the spills program.

Mr. Sosik assisted the developer in securing financing, and due to the demands of an aggressive construction schedule developed an Interim Remedial Measure (IRM), based on chemical oxidation treatment. Working closely with the clients environmental counsel, Mr. Sosik was able to get the IRM approved without a public comment period. Implementation of the IRM is currently underway.

The project was awarded the 2009 NYC Brownfield Award for Innovation.

Brandt Airflex, NY

Technical Consulting Services - Mr. Sosik provided senior level technical advice and strategic planning in developing an off-site RI/FS for the site, in negotiating a tax reduction for the property due to the environmental condition and in preparing a cost to cure estimate for settlement between business partners. After achieving a favorable tax consideration and settlement agreement for his client

Allied Aviation Services, Dallas, Fort Worth, Airport, Dallas, TX

Jet Fuel Investigation - Mr. Sosik developed and managed an investigative plan to quickly identify the extent and source of jet fuel which was discharging from the Airport's storm drain system to a creek a mile away. Through the use of a refined conceptual model, accelerated investigative techniques and a flexible work plan, he was able to identify the source of the fuel and the migration route within a single week. He then identifled remedial options and successfully negotiated a risk based plan with the Texas regulatory agency that had issued a notice of enforcement action against the facility.

KeySpan – Former LILCO Facilities, Various NY Locations

Pesticide Impact Evaluation - Developed, negotiated and implemented a site screening procedure to evaluate impact to public health and the environment as the result of past herbicide use at 211 utility sites. Using an unsaturated zone leaching model (PRZM) on a small subset of the sites, he was able to establish mass loading schedules for the remaining sites. This was combined with public well data in a GIS environment to perform queries with respect to mass loading, time transport and proximity to vunerable public supply wells. Using this approach Mr. Sosik was able to show that there were no concerns for future impact. This effort satisfied the public health and resource concerns of the state environmental agency and county health department in a reasonable amount of time and at a fraction of the cost of a full scale investigation.

Former Computer Circuits (Superfund) Site, Hauppauge, NY

CERCLA RI/FS - As Senior Project Manager for the site, he played a major role in regaining control of the investigation activites for the PRP. This action prevented the USEPA from initiating an extensive investigation at the site using a RAC II contractor allowing the client to perform a more efficient investigation. He was involved in all negotiations with EPA and was the project lead in developing a revised site characterization plan (work plan, field sampling plan, quality assurance plan, etc.). By carefully managing all phases of the investigation and continued interaction with each of the three regulatory agencies involved, Mr. Sosik was able to keep the project focused and incrementally reinforce the clients position. The estimated cost of the revised investigation is expected to save the client 1.5 to 2 million dollars.

Sun Oil, Seaford, NY

Remediation Consuliting Services & Project Management - Under an atmosphere of regulatory distrust, political pressure and mounting public hostility toward the client, Mr. Sosik conducted an off-site 3-D investigation to define the extent of contamination and the potential impact on public health. By designing and implementing an aggressive source area remediation program and personal interaction with the public and regulatory agencies, he was able to successfully negotiate a limited off-site remediation favorable to the client. Source area remediation was completed within 6 months and the project successfully closed without damage to the client's public image or working relationship with the regulatory agencies.

Con Edison, Various Locations, NY

Hydrogeologic Consulting Services - Under a general consulting contract, Mr. Sosik conducted detailed subsurface hydrogeologic investigations at five locations to assist in the development of groundwater contingency planning. He also developed and implemented work plans to investigate and remediate existing petroleum, cable fluid, and PCB releases at many of the generating facilities and substations. An important aspect of his role was in assisting the client in strategic planning and negotiations with the regulatory agency.

Keyspan - Tuthill Substation, Aqueboque, NY

Accelerated Site Characterization - Using accelerated site characterization techniques, Mr. Sosik presented the project as a case study in establishing the transport of an herbacide and its metobolites aplied at utility sites in the 1980's The results were then used to establish a screening method for evaluating 211 similar sites controlled by the client in a reasonable and eficient manner.

NYSDEC Spill, East Moriches, NY

Spill Release Analysis - With recognized expertise in the area of gasoline plume development on Long Island, Mr. Sosik was asked by

Charles B. Sosik, PG, PHG, Principal

the State to establish the release date (and principal responsible party) of an extensive petroleum spill, which impacted a residential neighborhood. He used multiple lines of evidence, and a new EPA model (HSSM), which he has helped to refine, to reconstruct the release scenario and spill date, in support of the State Attorney General's cost recovery effort from the PRP.

Minmilt Realty, Farmingdale, NY

Fate & Transport Modeling - He completed an RI/FS at this location for a PCE plume that had been in transit for over 30 years. Mr. Sosik applied a conservative model to evaluate time/concentration impacts under a variety of transport scenarios to a municipal wellfield located 13,000 feet away. Through the use of the model and careful interpretation of an extensive data set compiled from several sources, Mr. Sosik was able to propose a plan which was both acceptable to the regulator and favorable to the client.

Sebonack Golf Course Project, Town of Southampton, NY

IPM Pesticide Study - Provided professional hydrogeologic services in support of the EIS prepared for the development of the site. The proposed development included an 18-hole golf course, clubhouse, dormitory facility, cottages, associated structures, and a 6,000 square foot research station for Southampton College. Mr. Sosik performed an extensive evaluation (using a pesticide-leaching model) on the effects of pesticide and nitrogen loading to groundwater as part of the projects commitment to an Integrated Pest Management (IPM) approach.

NYSDEC, Spills Division, Regions 1 – 4

Petroleum Spills Investigation & Remediation - As a prime contractor/consultant for the NYSDEC in Regions 1-4, Mr. Sosik has managed the investigation and remediation of numerous petroleum spills throughout the State. Many of these projects required the development of innovative investigation and remediation techniques to achieve project goals. He was also involved in many pilot projects and research studies to evaluate innovative investigation techniques such as accelerated site characterization, and alternative approaches to remediation such as monitored natural attenuation and risk based corrective action.

Sun Oil, E. Meadow, NY

Exposure Assessment - Performed to seek closure of the spill file, despite the presence of contaminants above standards, Mr. Sosik determined after the extended assessment that the level of remaining contamination would not pose a future threat to human health or the environment. He used multiple lines of evidence, and a fate and transport model to show that degradation processes would achieve standards within a reasonable time.

Sand & Gravel Mine, NY

Property Development - As part of the development of a sand and gravel mine, Mr. Sosik provided environmental consulting services to assist in obtaining a mining permit, which would result in the construction of a 150-acre lake. Specifically, Mr. Sosik investigated if the proposed lake would reduce groundwater quantity to domestic and public well fields, and/or accelerate the migration of potential surface contaminants to the lower part of the aquifer. After assuming the lead role in negotiations with the regulatory agency, Mr. Sosik was able to obtain a permit for the client by adequately addressing water quality and quantity issues, and by preparing a monitoring plan and spill response plan, acceptable to all parties.

NYSDEC, Mamaroneck, NY

Site Characterization / Source Identification - In a complex hydrogeologic setting consisting of contaminant transport through fractured metomorphic bedrock and variable overburden materials, Mr. Sosik was able to develop and implement a sub-surface investigation to differentiate and separate the impact associated with each of two sources. The results of this investigation were successful in encouraging the spiller to accept responsibility for the release.

Riverhead Municipal Water District, NY

Site Characterization / Remedial Planning - Using accelerated characterization techniques, he implemented a 3-D site investigation to identify two service stations 4,000 ft. away as the source of contamination impacting a municipal wellfield. In accordance with the strict time table imposed by the need to return the wellfield to production by early spring, he designed and implemented a multi-point (9 RW, 6 IW) recovery and injection well system using a 3-d numerical flow model, and completed the project on time. Using a contaminant transport model, Mr. Sosik developed clean-up goals which were achieved in 9 months of operation, well below the projected 3 to 5 year project duration.

Montauk Fire Department, NY

Site Assessment - Mr. Sosik performed a limited investigation and used a 2-D flow model to demonstrate that the property could not have been the source of contamination which had impacted an adjacent wellfield as per the results of a previous investigation. This small focused effort successfully reversed a $500,000, and rising, claim against the department by the water district and the NYSDEC.

PREVIOUS EXPERIENCE

P.W. Grosser Consulting, Bohemia, NY
Senior Project Manager, 1999-2006

Environmental Assessment & Remediation, Patchogue, NY
Senior Project Manager, 1994-1999

Miller Environmental Group, Calverton, NY
Project Manager, 1989-1994

DuPont Biosystems, Aston, PA
Hydrogeologist, 1988-1989

EBC

ENVIRONMENTAL BUSINESSS CONSULTANTS

Charles B. Sosik, PG, PHG, Principal

EXPERT WITNESS TESTIMONY AND DEPOSITIONS

Fact Witness -Testimony on relative age of petroleum spill based on nature and extent of residual and dissolved components at the Delta Service Station in Uniondale, NY Fall/1999

Expert Witness / Expert Report for defendant in cost recovery case by NYS Attorney General regarding a Class II Inactive Hazardous Waste (State Superfund) project by the NYSDEC (October 2004 – present, Report: March 2005, Deposition: April 2005)

Expert Witness / Fact Witness for plaintiff seeking compensation for partial expenses incurred during the investigation and remediation of a USEPA CERCLA site due to the release and migration of contaminants from an "upgradient" industrial property. (Deposition May 2005, case settled April 2007).

Expert Witness / Fact Witness for NYS Attorney General with respect to cost recovery for a NYSDEC petroleum spill site in Holtzville, NY (Deposition April 2005 - case settled).

Expert Witness – Statement of opinion and expert testimony at trial for plaintiff seeking damages from a major oil corporation for contamination under a prior leasing agreement in Rego Park, NY. Case decided in favor of plaintiff. Trial July 2007, In favor of Plaintiff. Qualified as Expert Witness.

Expert Witness / Fact Witness for NYS Attorney General with respect to cost recovery for a NYSDEC petroleum spill site in Lindenhurst, NY (Trial date December 2009, in favor of plaintiff. Qualified as Expert Witness.

Expert Witness / Fact Witness for defendant with respect to cost recovery and third party responsibility for a NYSDEC petroleum spill site. (Expert Statement of Fact – October 2005).

Expert Witness for plaintiff seeking damages related to a petroleum spill from the previous owner/operator of a gas station in College Point, NY. Case settled 2009.

Expert Witness for plaintiff (municipal water supply purveyor) seeking damages from major oil companies and manufacturer of MTBE at various locations in Suffolk County, NY. Expert reports July 2007, August 2007 and October 2007, Case settled August, 2008.

Expert Witness - Deposition for NYS Attorney General regarding NYSDEC cost recovery for a petroleum spill site at Sag Harbor, NY. August 2002

Expert Witness - for NYS Attorney General regarding NYSDEC cost recovery for a petroleum spill site at Riverhead, NY. Case settled July 2008.

Expert Witness for defendant responding to a claim from adjacent commercial property owner on the origin of chlorinated solvents on plaintiff's property located in Cedarhurst, NY. Eexpert opinion submitted to lead counsel on March 6, 2009, case settled April 2009.

Expert Report - for Attorney General on modeling performed to determine the spill release scenario at a NYSDEC petroleum spill site in East Moriches, NY. June 2000.

MODELING EXPERIENCE (PARTIAL LISTING)

PROJECT	MODEL	APPLICATION
Riverhead Water District, Riverhead, NY	MODFLOW, MODPATH	Remediation system design to intercept MTBE plume and prevent continued impact to municipal well field.
NYSDEC - Region 1, Holbrook, NY	MODFLOW, MODPATH	Simulate transport of MTBE plume to predict future impact.
NYSDEC - Region 1, East Moriches, NY	HSSM	Evaluate release scenario and start date of petroleum spill in support of cost recovery by NYS AG office.
AMOCO, Deer Park, NY	HSSM	Estimate release amount, start date and spill scenario to evaluate the potential for mass unaccounted for
Keyspan Energy, Nassau/Suffolk Counties Substations	PRZM	Estimate mass load of simazine used at 211 electric substations and screen sites according to potential for human health and ecological impacts.
Saboneck Golf Club, Southampton NY	PRZM	Estimate mass load of proposed pesticides on new golf course to evaluate acceptability under an IPM program.
Suffolk County Department of Public Works (SCDPW) Scavenger Waste Treatment Plant, Yaphank, NY	DYNFLOW, DYNTRAC	Evaluate time-transport and nitrogen impact on local river system.
SCDPW SUNY Waste Water Treatment Plant, Stony Brook, NY	DYNFLOW, DYNTRAC	Determine outfall location and time-transport of nitrogen from proposed upgrades to an existing wastewater treatment plant
Water Authority of Great Neck North Great Neck, NY	MODFLOW, MODPATH, MT3D	Review of modeling study performed by EPA to evaluate potential future impact to Well field from PCE plume. Identified serious flaws in model construction and implementation, which invalidated conclusions

PUBLICATIONS

Smart Pump & Treat Strategy for MTBE Impacting a Public Water Supply (14th Annual Conference on Contaminated Soils Proceedings, 1998)

Transport & Transformation of BTEX & MTBE in a Sand Aquifer (Groundwater Monitoring & Remediation 05/1998)

Characteristics of Gasoline Releases in the Water Table Aquifer of Long Island (Petroleum Hydrocarbons Conference Proceedings, 1999)

Field Applications of the Hydrocarbon Spill Screening Model (HSSM) (USEPA Interactive Modeling Web Course www.epa.gov/athens/software/training/webcourse Authored module on model application and applied use of calculators, 02/2000)

Comparative Evaluation of MTBE Sites on Long Island, US EPA Workshop on MTBE Bioremediation (Cincinnati, 02/2000)

Comparison of Four MTBE Plumes in the Upper Glacial Aquifer of Long Island (American Geophysical Union, San Francisco, 12/1996)

Analysis and Simulation of the Gasoline Spill at East Patchogue, New York (American Geophysical Union, San Francisco, 12/1998)

ARIEL CZEMERINSKI, P.E.
P.O. Box 43
Albertson, NY 11507-0043
mobile (516) 987-1662
fax (516) 706-3214
Email: ariel@amc-engineering.com

SUMMARY:

New York State Professional Engineer. Results-oriented Chemical and Environmental Engineer, with 15 years of experience in the chemical and environmental areas. Areas of expertise include process control and automation, process optimization, productivity improvement, quality systems, environmental compliance, process and plant safety, and management of a production facility. A team player with excellent technical problem solving ability and strong communications skills. Registered PE in NY, IN, IL, and MI.

PROFESSIONAL EXPERIENCE:

1997-present AMC Engineering, PLLC. Roslyn Heights, NY.
Principal. Clients range from small car wash and Laundromat operators to multimillion-dollar chemical process companies.

- Engineering Consulting Services.
- Environmental Compliance, Permitting. Clean Water Act, Clean Air Act. Hazardous Materials.
- Chemical Process Design and Optimization. Process scale up.
- Wastewater Treatment systems.
- Design of cleaning compounds for the Transportation industry.
- Zoning regulations. Expediting Services. NYFD, NYC Buildings, NYSDEC, Suffolk County
- Safety and environmental training.
- Quality (ISO 9000) Management Systems: System auditing and implementation.
- Expert witness and testimony.

EDUCATION:
1988-1990 COLUMBIA UNIVERSITY, New York, NY M.S. Chemical Engineering, Feb. 1990.
Awarded Fellowship as a Teaching Assistant. Thesis: Optimal Periodic Control.

1981-1987 UNIVERSITY OF BUENOS AIRES, Buenos Aires, Argentina.
Chemical Engineer (six year program). Graduated in top 3% of class.
Teaching Assistant of Inorganic Chemistry. Thesis: Feasibility study for the production of pectin. Fats and Oils refinery plant.

Continuing Education Courses attended: (partial list)
Building Inspections Course
Environmental Regulation
Design of Chemical Reactors
Process Hazard Analysis
Hazardous Materials Regulations
CPR Training
Supervisors Training OSHA regulations ISO 9000
Lead auditor training Wastewater Treatment System

ADDITIONAL INFORMATION
Past Chairman of the New York Section, AIChE (American Institute of Chemical Engineers).
Fluent in Spanish.

EBC

ENVIRONMENTAL BUSINESSS CONSULTANTS

Kevin R. Brussee, Project Manager

Professional Experience
EBC: January 2008
Prior: 6 years

Education
MS, Environmental Studies, University of Massachusetts, Lowell
BS, Environmental Science, Plattsburgh State University, NY

Areas of Expertise
- Site Investigations
- NYSDEC Spill Closure
- Gasoline/Fuel Oil Tank Removals
- NYC "E" Designations

Professional Certification
- OSHA 40-hr HAZMAT
- OSHA 8-hr HAZMAT Supervisor

PROFILE

Mr. Brussee has 8 years experience as an environmental consultant/contractor and has worked on and managed a wide range of environmental projects. Mr. Brussee has conducted Phase I, II and III Environmental Site Assessments for commercial, industrial, and residential properties in New York, Maryland and Delaware.

Mr. Brussee's field experience includes tank removal and installations, spill management and closure, soil and groundwater sampling, excavation and disposal and site health and safety supervison. In addition, Mr. Brussee has performed project research, data reduction and evaluation, and has prepared reports for both regulatory and client use.

PREVIOUS EXPERIENCE

Eastern Environmental Solutions, Inc., Manorville, NY
Project Manager, 2006-2008

EA Engineering, Science & Technology
Hydrogeologist, 2005-2006

P.W. Grosser Consulting, Bohemia, NY
Field Hydrogeologist, 2002-2003

PUBLICATIONS

Chemical Stress Induced by Copper, Examination of a Biofilm System;
(Water Science Technology, 2006; 54(9): 191-199.)

ROBERT W SCARPA JR
ARCHITECT

345 EAST 73rd STREET NEW YORK NY 10021 TEL 212 988 5209 FAX 212 706 9131

RESUME

EMPLOYMENT

1/99-Present

ROBERT W SCARPA JR ARCHITECT
New York, New York

Principle

Since starting this firm I have been able to participate in a variety of projects ranging from corporate interiors, new multi-family and single family housing, renovations, additions, and new buildings. I have been the principle designer of many of these projects and have participated in them as the architect of record as well as a consultant to other design firms who did not have the expertise to complete the work. In addition I have been retained as a consultant by owners who required assistance in reviewing and supplementing the work of their design professionals who were not fully capable of developing their projects.

Projects have ranged in scale from $50,000 to $45,000,000.

6/95-12/98

SALSANO ASSOCIATES ARCHITECTS
New York, New York

Director of Design

Principal designer as well as director of professional staff in the preparation of design and construction documents and director of construction administration. Cultivated potential clients and obtained commissions for the firm. Hired staff and consultants.

Projects included new commercial and multi-family residential buildings, large scale corporate interiors, medical offices, showrooms, executive offices and facade renovation.

9/92-3/95

PLATT BYARD DOVELL ARCHITECTS
New York, New York

Project Manager

Senior staff position requiring management and training of junior staff, organizing project development and construction documents, coordinating multiple consultants, NYC building and zoning code analyses, as well as reporting to the firm's partners on office organization and quality control procedures.

Projects included core, office interiors, and showrooms for the Chanel building, 15 E. 57th Street, NYC ($35 million), a medical laboratory/ office building ($25 million), that was an adaptive reuse of a Tribeca perfume warehouse, several corporate interiors projects including trading rooms for a major Wall Street bank.

2/92-8-92

CONSULTANT IN PRIVATE PRACTICE

Prepared specifications for a 26 story Manhattan residential high-rise and completed a window replacement program for The Manhattan School of Music.

5/85-2/92

ULRICH FRANZEN & ASSOCIATES
New York, New York

Associate

Responsible for managing the firm's work as well as hiring, training and assigning staff. Duties included substantial client contact and construction administration. Experienced in the following: hiring and coordinating multiple consultants, acoustical design, lighting design, specification writing, and working with associated architectural and interior design firms. Directed all phases of projects from programming and schematic design through design development, construction documents, construction administration, and project close-out. Co-designer on projects with the firm's principal.

Projects managed ranged in scale from $1-15 million and included commercial buildings and office interiors, educational facilities including a dormitory, recital hall, music practice rooms and a library, restoration/ renovation both commercial and residential as well as single-family residential buildings including steel frame, wood frame and NYC apartments.

PROFESSIONAL REGISTRATION

New York State
New Jersey
NCARB Certificate

EDUCATION

Columbia University Graduate School of Architecture and Planning
Master of Science in Architecture, 1985

New York Institute of Technology, Old Westbury, New York
Bachelor of Architecture, Magna Cum Laude, 1984
Gold Medal for Architectural Design Excellence

TEACHING EXPERIENCE

Adjunct Assistant Professor of Architecture
New York Institute of Technology, Old Westbury, New York
Second Year Studio Critic, 1988-1990

Guest Critic
Parsons School of Design, 1998-2002
New York School of Interior Design, 1990-1997

RICHARD J. POWERS

3096 Decatur Avenue, Bronx, New York 10467 Home (718) 547-7159 Cell (516) 250-5343 email: rjp3096@yahoo.com

My career goal is to obtain a position as a Director Of Design and Construction for a mid- sized construction company in the New York City metropolitan area.

MANAGEMENT

**** Construction * Operations * Facilities *Value Engineering *Analysis***

I am a professional with a proven successful track record in developing and managing operational systems, enhancing performance and quality of services rendered, and directing projects through completion, resulting in cost effective operations and profitability.

I am skilled in recognizing patterns and opportunities, identifying problems and initiating corrective action for resolution. I am systematic in defining objectives and coordinating available and potential resources. I am adept in presenting ideas and concepts to instruct, motivate, train, and empower staff and clients. I achieve results through analysis, attention to detail, follow through, and hands on participation.

B.P.S. Construction Management, The Pratt Institute 2003

EXPERIENCE

Coastal Builders Corp. / The Arker Companies., Woodmere, New York **2003 – Present**
Senior Project Manager. Last two projects successfully completed: $60 M renovation project of 816 apartments in three sites in Coney Island, N.Y. / Mixed use building, Bronx, N. Y. comprising 100 apartments and a 20,000 SF Staples store on a Brownfield site.

L & M Builders, Larchmont, New York **2001 – 2003**
Senior Superintendent / Project Manager. Successfully completed the gut renovation of 216 apartments in thirteen buildings on West 148th Street in Harlem. Project entailed combining all of the buildings into a single apartment building..

Kessler Assisted Living Centers, Bloomfield, New Jersey **1998 – 2001**
Director of Design and Construction. Oversaw the design and construction of assisted living and Alzheimer residences in New Jersey, Florida and Colorado. Oversaw the design and construction of the first LEEDS "green" assisted living facility in Chatham, New Jersey.

Wagman Construction Company, New York 1997 – 1998
Project Manager

The National Equity Fund, New York, New York 1995-1997
Facilities Manager – Responsible for construction management supervision and capital planning for national portfolio of eight thousand apartments. Trained asset managers and general partners in capital planning, construction and maintenance procedures.

Powers Contracting, Inc., Bronx, New York 1987 – 1995
President – Operated all phases of a general contracting and development business.

The Bodak Organization, Bronx, New York 1983 – 1986
Director of Maintenance and Construction

The National Association of Home Builders, Bronx, New York 1980 – 1983
Director of Vocational Training – Bronx Job Corps Center

ATTACHMENT F
BCP SIGN SPECIFICATIONS

New York State Brownfields Cleanup Program

Former Uniforms for Industry Site
BCP Site No. C-241103
Union Jamaica, LLC

Governor David A. Paterson
NYSDEC Acting Commissioner Peter A. Iwanowicz
Mayor Michael R. Bloomberg

Transform the Past.... Build for the Future

SIGNS FOR REMEDIAL PROGRAMS

Instructions

Signs are required at sites where remedial activities are being performed under one of the following remedial programs: State Superfund, Voluntary Cleanup Program (VCP), Brownfield Cleanup Program (BCP), Environmental Restoration Program (ERP), Brownfield Opportunity Area (BOA) Program (note: activities under this program would be for investigation). The cost of the sign will be borne by the parties performing the remedial activities based on the legal document the activities are being performed under (i.e. volunteers/participants would pay 100% of the cost under the BCP; municipalities would be reimbursed for 90% of the cost under the ERP).

Sign Requirements

Size: **Horizontal format - 96" wide by 48" high**

Construction Materials: **Aluminum or wood blank sign boards with vinyl sheeting.**

Inserts: **"Site Name", "Site Number", "Name of Party Performing Remedial Activities" and "Municipal Executive".**
Indicate position, size and topography for specific inserts.

Color Scheme: **Copy surrounding DEC logo - "NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION" - PMS 355**

DEC logo: **PMS 301 Blue**
PMS 355 Green

Text:

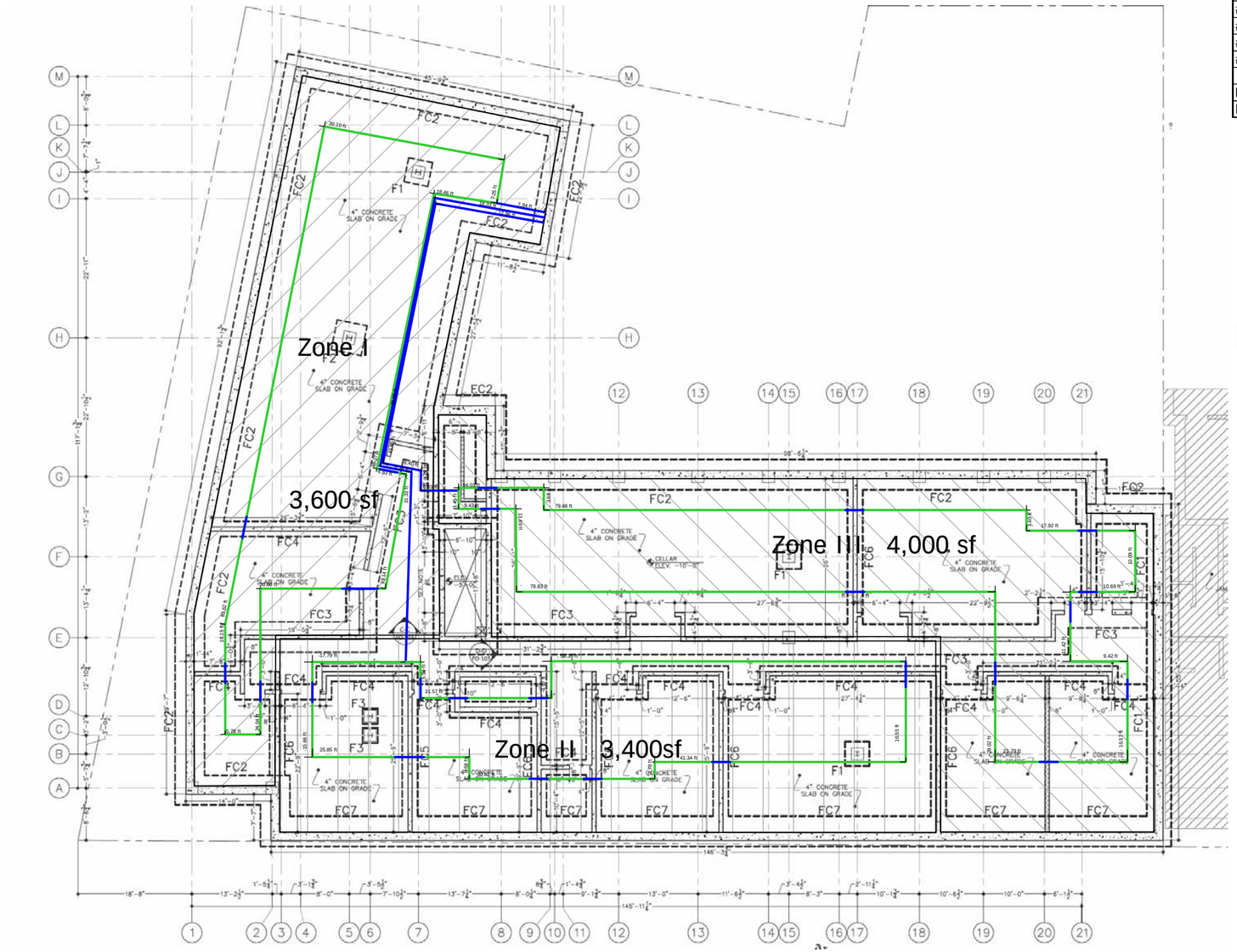
Program (choose one):	**PMS 301**
Brownfield Cleanup Program	
Voluntary Cleanup Program	
Brownfield Opportunity Areas Program	
Petroleum Remediation Program	
State Superfund Program	
1996 Clean Water/Clean Air Bond Act - Environmental Restoration Program	
Site Name, Site Number, Party Performing Remedial Activities	**PMS 355**
Names of Governor, Commissioner, Municipal Executive	**PMS 301**
Transform the Past.....Build for the Future	**PMS 355**

Type Specifications: **All type is Caslon 540, with the exception of the logotype.**
Format is: center each line of copy with small caps and initial caps.

Production Notes: **96" wide x 48" high aluminum blanks will be covered with vinyl sheeting to achieve background color. Copy and logo will be silk screened on this surface.**

See attached format

ATTACHMENT G
SSDS AND VAPOR BARRIER DESIGN SPECIFICATIONS



	Zone I	Zone II	Zone III
4"HDPE Corrugated Pipe	270	246	332
4" Cast Iron (ft)	8	100	78
Riser (ft) 6" cast iron (ft)	34	34	34
# elbows 90 -4" sweep	10	13	17
#elbow 22.5 (4")	2		
# Reducer 4-6	1	1	1
# Tees 4"	1	1	1
Fan Selected			
RadonAway	RP265	RP265	RP265

Foundation plan obtained from FO-001 from Hugo Subotovsky, AIA.

4" HDPE CORRUGATED PIPE

4" Cast Iron (6" Riser)

SSDS Zone

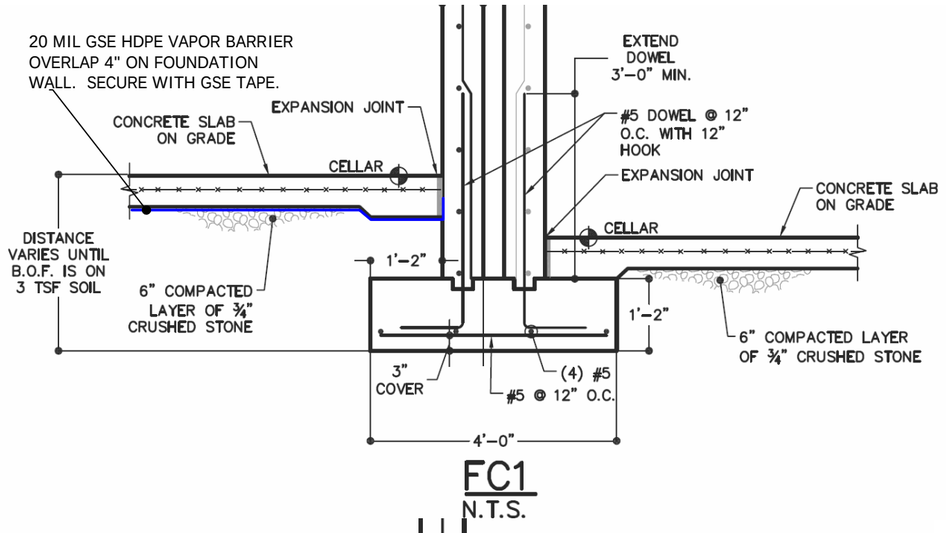
No	Revision/Issue	Date

AMC ENGINEERING PLLC
P.O. Box 43
Albertson, NY 11507-0043
516 987-1662

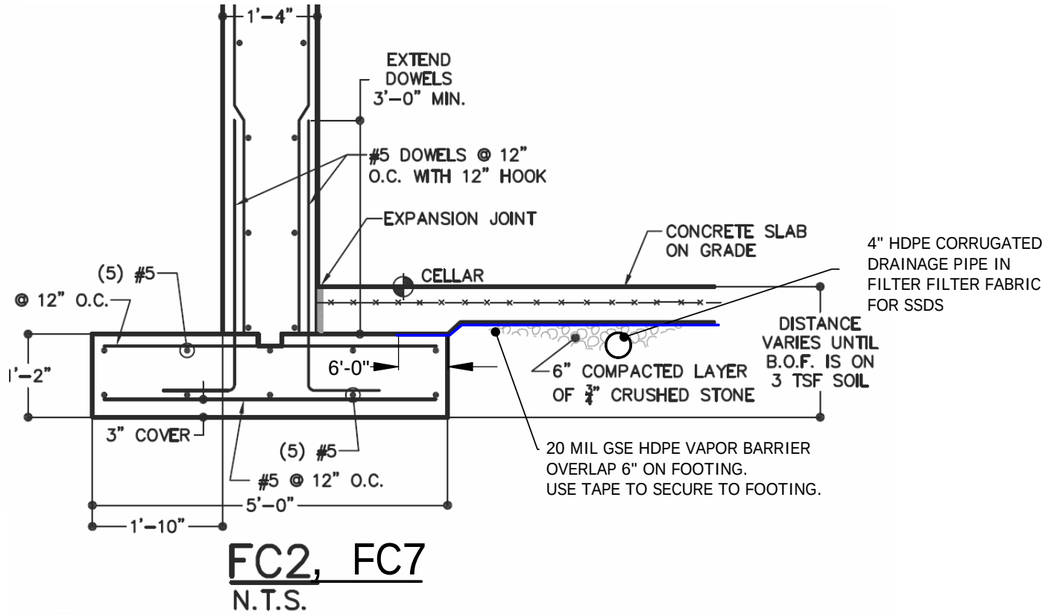
PROJECT
RICHMOD HILL SENIOR LIVING RESIDENCE
129-01 Jamaica Ave@ 127 St
QUEENS, NY
B 9821 L 44

TITLE:
SUBSLAB DEPRESSURIZATION SYSTEM DESIGN

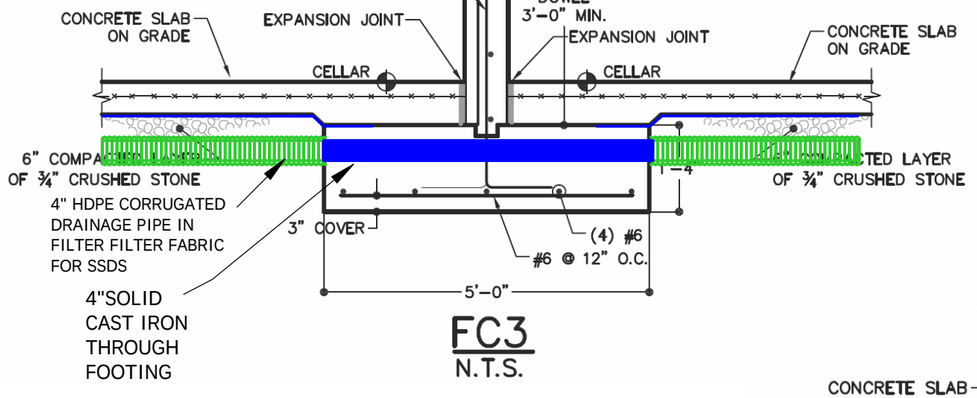
DATE: 10/20/10
PROJECT No:
DRAWING BY: AC
CHK BY:
DWG No:
ENV-001
CADO FILE No:



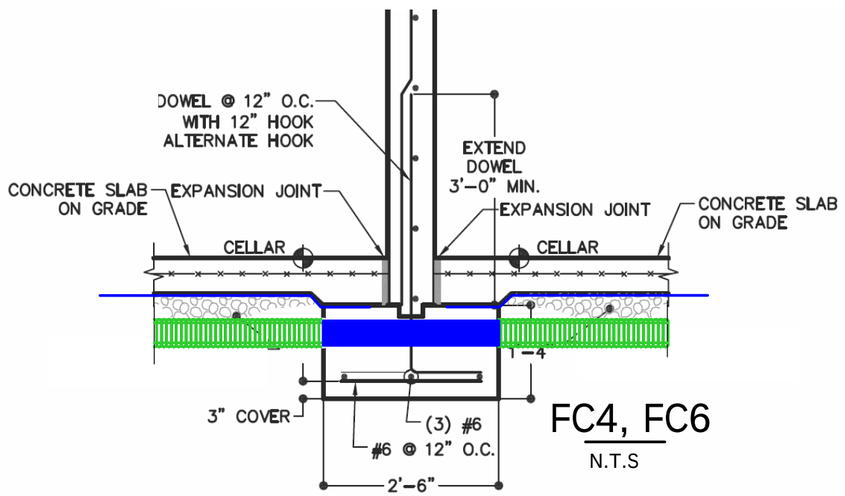
FC1
N.T.S.



FC2, FC7
N.T.S.



FC3
N.T.S.



FC4, FC6
N.T.S

NOTES:
1. REFER TO ARCHITECTURAL PLAN FOR WATERPROOFING REQUIREMENTS.
2. FOUNDATION WALL BELOW CELLAR SLAB ELEVATION MAY BE REQUIRED IF 3TSF SOIL IS NOT ENCOUNTERED IMMEDIATELY BENEATH BOTTOM OF FOOTING.
3. REFER TO FO-001 FOR BOTTOM OF FOOTING ELEVATIONS.

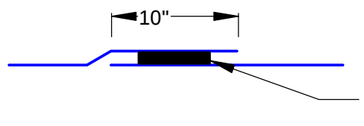
No	Revision/Issue	Date

AMC ENGINEERING PLLC
P.O. Box 43
Albertson, NY 11507-0043
516 987-1662

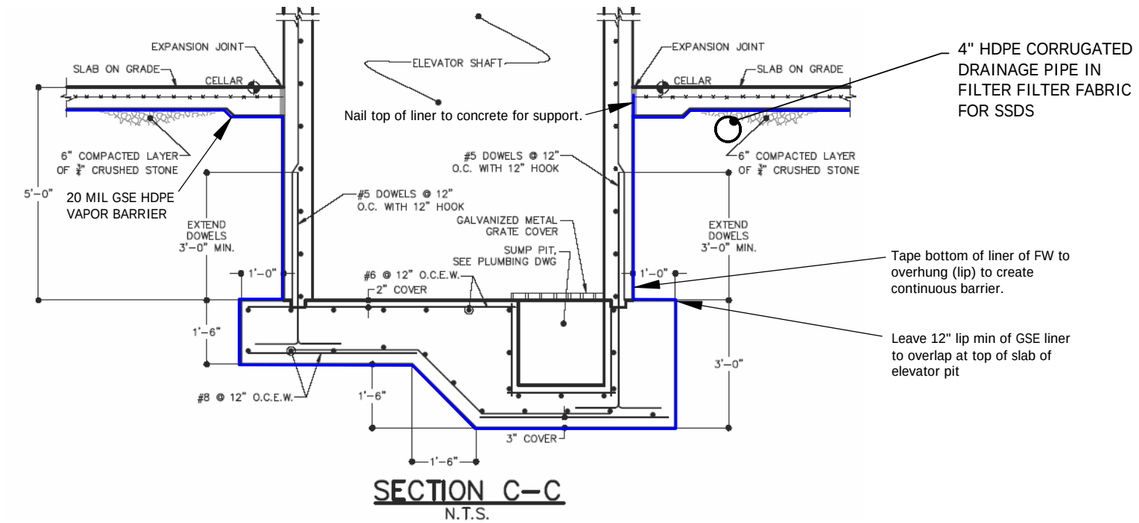
PROJECT
RICHMOD HILL SENIOR
LIVING RESIDENCE
129-01 Jamaica Ave@ 127 St
QUEENS, NY
B 9821 L 44

TITLE:
SUBSLAB DEPRESSURIZATION
SYSTEM DESIGN

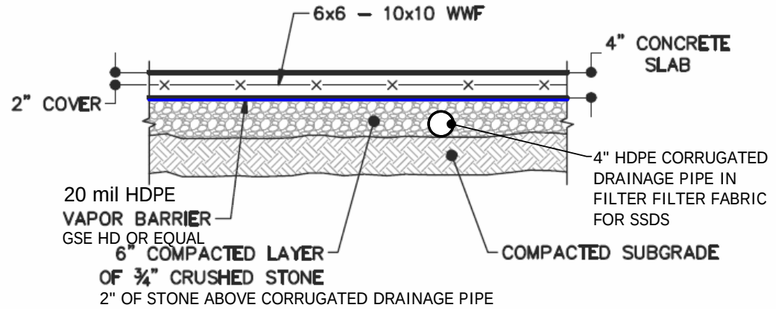
DATE: 10/20/10
PROJECT No:
DRAWING BY: AC
CHK BY:
DWG No:
ENV-002
CADO FILE No:
1 of 4

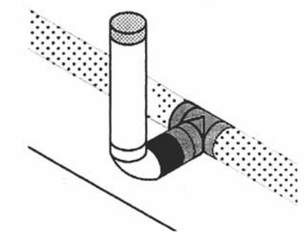


20 mil HDPE liner Overlap Detail



EVEVATOR PIT DETAIL





OFFSET VERTICAL SUCTION POINT-TRANSITION TO 6" CAST IRON.

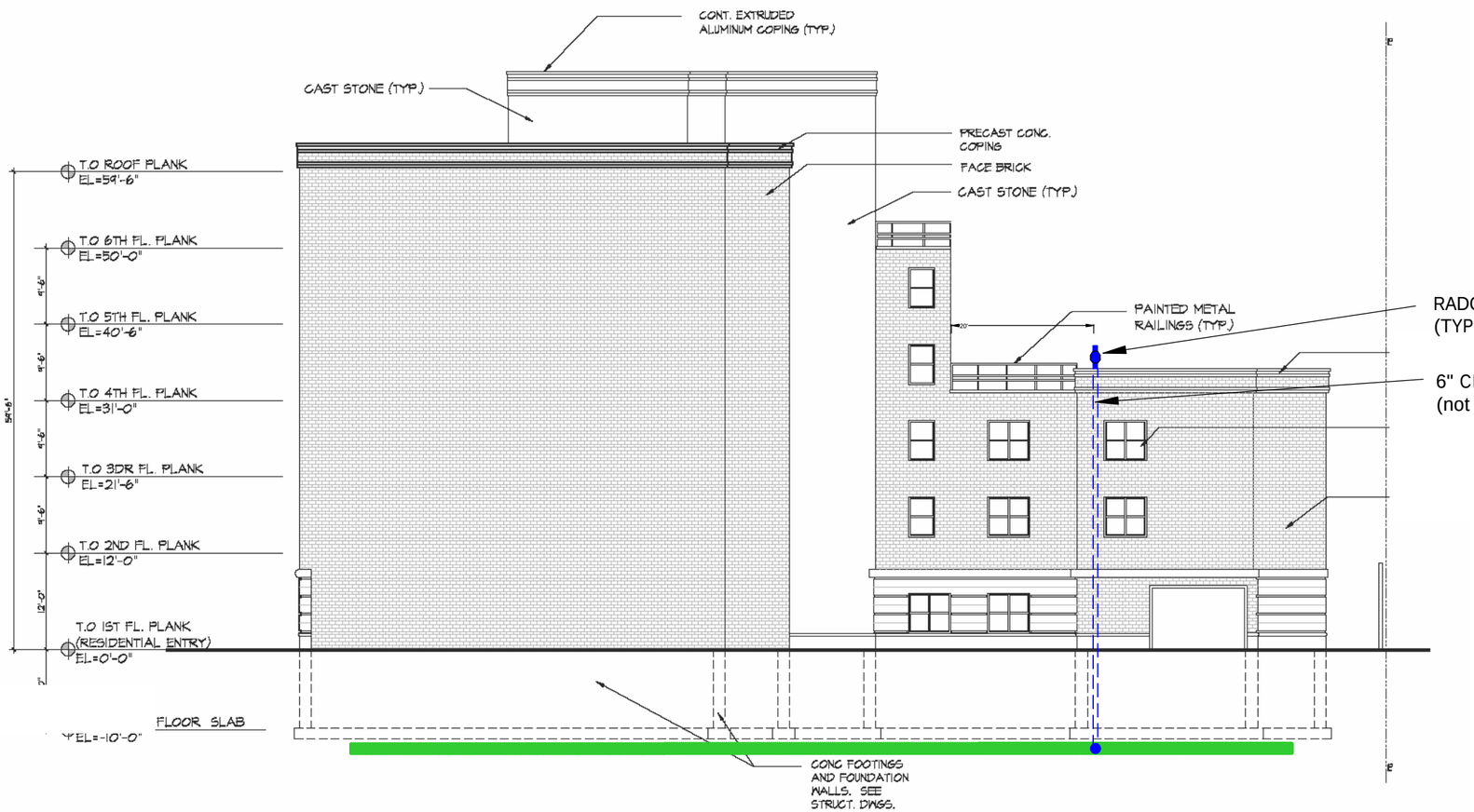
No	Revision/Issue	Date

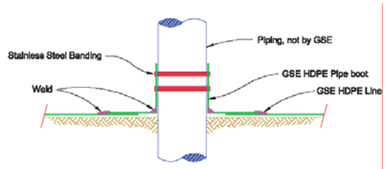
AMC ENGINEERING PLLC
P.O. Box 43
Albertson, NY 11507-0043
516 987-1662

PROJECT
RICHMOD HILL SENIOR LIVING RESIDENCE
129-01 Jamaica Ave@ 127 St
QUEENS, NY
B 9821 L 44

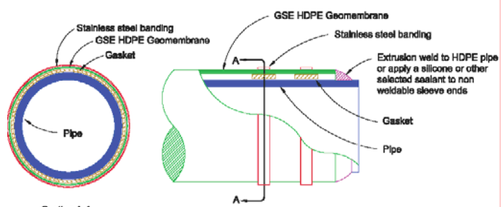
TITLE:
SUBSLAB DEPRESSURIZATION SYSTEM DESIGN

DATE: 10/20/10
PROJECT No:
DRAWING BY: AC
CHK BY:
DWG No:
ENV-003
CADO FILE No:





Typical Vertical Pipe Penetration
Not to Scale



Pipe Penetration Seal
(Vertical or horizontal)
Not to scale

No	Revision/Issue	Date

AMC ENGINEERING PLLC
P.O. Box 43
Albertson, NY 11507-0043
516 987-1662

PROJECT
RICHMOD HILL SENIOR LIVING RESIDENCE
129-01 Jamaica Ave@ 127 St
QUEENS, NY
B 9821 L 44

TITLE:
SUBSLAB DEPRESSURIZATION SYSTEM DESIGN

DATE: 10/20/10
PROJECT No:
DRAWING BY: AC
CHK BY:
DWG No:
ENV-004
CADO FILE No:
1 of 4

Vapor Barrier Design and Installation

A vapor barrier is being recommended for this project as a preventative measure. This section includes the specifications and guidelines for installing a below concrete slab sheet vapor barrier. The vapor barrier will extend throughout the area to be occupied by the new multi-use building to be constructed on the site. Vapor barrier seams, penetrations, and repairs will be sealed either by the tape method or weld method, according to the manufacturer's recommendations and instructions.

A vapor retarder or barrier, by definition, is a material or assembly of materials that resists vapor diffusion through it. For this project the sheet material will consist of a black high-density polyethylene (HDPE) film, 20 mil thick.

ASTM references for vapor barriers include the following:

1. ASTM E 1745-97 "Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs."

2. ASTM E 1643-98 "Standard Practice for Vapor Barriers."

Materials
The minimum values for the HDPE film will meet the following:

Property	Test Method	Minimum Values
Thickness, mil (mm)	ASTM D 5199	20
Density, g/cm3	ASTM D 1505	0.94
Carbon Black Content, %	ASTM D 1603, mod.	2.0
Tensile Properties (each direction)	ASTM D 6693	
Strength at Yield, lb/in. (kN/m)		22
Strength at Break, lb/in. (kN/m)		44
Elongation at Yield, %	(1.3" gauge length)	10
Elongation at Break, %	(2.0" gauge length)	500
Tear Resistance, lb (N)	ASTM D 1004	5
Puncture Resistance, lb (N)	ASTM D 4833	26
Notched Constant Tensile Load, hours	ASTM D 5397, app.	400
Oxidative Induction Time, min.	ASTM D 3895	100

The manufacturer of the specified liner is: GSE LINING TECHNOLOGY, INC.

1. All joints in the HDPE sheeting will be sealed with either a tape seal or a weld seal. The tape seal consists of a butyl mastic self-adhering tape, 2 inch (50 mm) wide, compatible with the sheet material.
2. The weld seal consists of an extrudate rod or bead, compatible with sheet material.

Preparation for the installation of the vapor barrier membrane is as follows:

3. Do not install vapor retarder/barrier until items penetrating it are in place.
4. Rake, trim, and tamp surfaces over which membrane is to be installed.
5. Substrates must be regular and smooth with no gaps or voids greater than 0.5 inches (12 mm).
6. The substrate must be free of loose aggregate and sharp protrusions.
7. The substrate does not need to be dry, but standing water must be removed.

Membrane Installation

Place the membrane HDPE film side to the substrate with printed coating side up facing towards the concrete pour. Lay membrane with seams perpendicular to and lapped in direction of concrete pour.

End laps should be staggered to avoid a build-up of layers. Accurately position succeeding sheets to overlap the previous sheet 3 inches (75 mm). Ensure that the underside of the succeeding sheet is clean, dry, and free from contamination before attempting to overlap.

If manufacturer recommends sealing overlaps with tape, proceed with the following steps:

8. Secure overlaps to the bottom sheet with tape.

9. Ensure a continuous bond is achieved without creases and roll firmly with a heavy roller. During cold or damp conditions, the tape adhesive can be gently warmed using a hot air gun or similar to remove moisture or condensation and improve initial adhesion.

10. If manufacturer recommends sealing overlaps by welding, weld overlap seams according to manufacturer's instructions.

11. Penetrations through the membrane such as utility conduits, can be sealed either using the tape and liquid membrane method or the extrusion weld method.

Procedures for sealing penetrations using the tape and seal method include the following:

12. Scribe membrane tight to the penetration.
13. If the membrane is not within 0.5 inches (12 mm) of the penetration, apply tape to cover the gap.
14. Wrap the penetration with tape by positioning the tape 0.5 inches (12 mm) above the membrane.
15. Mix and apply Liquid Membrane around the penetrations using a fillet to provide a watertight seal between the membrane and tape.

Procedures for sealing penetrations using the extrusion weld method include the following:

Scribe membrane tight to the penetration.

16. Perform extrusion weld techniques according to manufacturer's instructions.

Protection

Protect membrane from damage until permanent covering is in place.

Membrane Repair
The membrane can be repaired using either the tape method or the weld method.

The procedure to repair the membrane using the tape method is as follows:

- Repair punctures and tears in membrane using patches of the material and overlapping the puncture or tear a minimum of 12 inches.

- Seal with tape.

The procedure to repair the membrane using the weld method is as follows:

- Repair punctures and tears in membrane using patches of the material and overlapping the puncture or tear a minimum of 6 inches. Seal with extrusion weld.

Inspection
Upon completion of the installation of the membrane, the Contractor shall coordinate an inspection with the Engineer or its designated representative. The membrane shall not be covered until the Contractor receives written approval from the Engineer.

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

Technical Note

Permeability For GSE Geomembranes

Due to its chemical structure, polyethylene is an (essentially) impermeable substance. The material is made up of very long molecules. There does exist, however, molecular voids (sometimes referred to as "free space") among the individual polyethylene chains. The existence of these spaces is recognized when we say polyethylene is essentially impermeable. Permeation may exist when, for instance, the pressure behind the permeant is very high or the permeant's molecular size is very small. However, the degree of permeation exhibited is difficult to determine using currently available test procedures. As a result, test results frequently reflect the inaccuracy of the procedure rather than the permeation of the material. Testing of GSE HDPE performed by an independent laboratory produced the following results.

Test	ASTM Method	Results
Methane Permeability	D 1434	2.0 x 10-6 mL/cm²·s
Water Vapor Permeability	E 96	1.7 x 10-9 mL/cm²·s

It must be emphasized that different chemicals will permeate at different rates due to differences in molecular shape, polarity and phase (gas or liquid). For example, the relatively small water molecule (atomic weight 18) will more easily permeate the polyethylene matrix as compared to a large molecule such as cyclohexanol (atomic weight 94).

The molecules' polarity must also be considered (recall the adage "like dissolves like"). Polyethylene is a non-polar molecule, therefore other non-polar molecules will permeate the matrix better. Examples of these molecules are hydrocarbons - especially those such as octane, pentane and hexene. The permeation of these are therefore greater than for polar molecules such as water.

A sometimes overlooked factor when reviewing permeation data is that most permeameters apply pressure to encourage permeation. In geotechnical and environmental applications, geomembranes are not subjected to the high pressures of potential permeants as they are in a permeation laboratory test. The lack of a driving force greatly diminishes actual permeation since the gaseous molecules find an easier path to follow than through the polyethylene liner. Also, because of the high pressures required to force permeants through polyethylene, failure of the permeameter is common. This is commonly in the form of a test apparatus leak. Such leaks can result in erroneous results.

TN006 PermeabilityGeomem R03/17/06

North America	GSE Lining Technology, Inc.	Houston, Texas	800 435 2008	281 443 8564	Fax: 281 230 8650
South America	GSE Lining Technology Chile S.A.	Santiago, Chile		56 2 595 4200	Fax: 56 2 595 4290
Asia Pacific	GSE Lining Technology Company Limited	Bangkok, Thailand		66 2 937 0091	Fax: 66 2 937 0097
Europe & Africa	GSE Lining Technology GmbH	Hamburg, Germany		49 40 767420	Fax: 49 40 7674234
Middle East	GSE Lining Technology-Egypt	The 6th of October City, Egypt		202 2 828 8888	Fax: 202 2 828 8889

www.gseworld.com

Technical Note

Chemical Resistance For GSE Geomembranes

GSE geomembranes are made of high quality, virgin polyethylene which demonstrates excellent chemical resistance. GSE polyethylene geomembranes are resistant to a great number and combinations of chemicals. It is this property of (HDPE) high density polyethylene geomembranes that makes it the lining material of choice.

In order to gauge the durability of a material in contact with a chemical mixture, testing is required in which the material is exposed to the chemical environment in question. Chemical resistance testing is a very large and complex topic because of two factors. First, the number of specific media is virtually endless and second, there are many criteria such as tensile strength, hardness, etc. that may be used to assess a material's resistance to degradation.

The chemical resistance of polyethylene has been investigated by many people over the past few decades. We are able to draw from that work when making statements about the chemical resistance of today's polyethylene geomembranes. In addition to that, many tests have been performed that specifically use geomembranes and certain chemical mixtures. Naturally, however, every mixture of chemicals cannot be tested for. As a result of these factors, GSE published a chemical resistance chart, demonstrating general guidelines.

Polyethylene is, for practical purposes, considered impermeable. Be aware, however, that all materials are permeable to some extent. Permeability varies with concentration, temperature, pressure and type of permeant. The rates of permeation are usually so low, however, that they are insignificant. As a point of reference, polyethylene is commonly used for packaging of several types of materials. These include gasoline, motor oil, household cleaners (i.e. bleach), muratic acid, pesticides, insecticides, fungicides, and other highly concentrated chemicals. Also, you should be aware that there are some chemicals which may be absorbed by the material but only when present at very high concentrations. These include halogenated and/or aromatic hydrocarbons at greater than 50%; their absorption results in swelling and slight changes in physical properties such as increased tensile elongations. This includes many types of fuels and oils. Recognize that this action, however, does not affect the liner's ability to act as a barrier for the material it is containing.

Since polyethylene is a petroleum product, it can absorb other petroleum products. Like a sponge, the material becomes slightly thicker and more flexible but does not produce a hole or void. However, unlike a sponge, this absorption is not immediate. It takes a much longer time for a polyethylene liner to swell than it does for a sponge. The exact time it takes for swelling to occur depends on the particular constituents and concentrations of the contained media. However, a hole would not be produced. Also, this absorption is reversible and the material will essentially return to it's original state when the chemical is no longer in contact with the liner.

With regard to typical municipal landfills in the United States, legally allowable levels of chemicals have been demonstrated to have no adverse affect on polyethylene geomembrane performance. The very low levels of salts, metals and organic compounds do not damage polyethylene. A double-lined containment with a leachate (leak detection) removal system effectively prevents any significant, continuous exposure of the secondary membrane to these materials and for practical purposes makes the total liner system even more impermeable.

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South America	GSE Lining Technology Chile S.A.	Santiago, Chile		56 2 595 4200	Fax: 56 2 595 4290
Asia Pacific	GSE Lining Technology Company Limited	Bangkok, Thailand		66 2 937 0091	Fax: 66 2 937 0097
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Middle East	GSE Lining Technology-Egypt	The 6th of October City, Egypt		202 2 828 8888	Fax: 202 2 828 8889

www.gseworld.com

Technical Note

Chemical Resistance Chart

GSE is the world's leading supplier of high quality, polyethylene geomembranes. GSE polyethylene geomembranes are resistant to a great number and combinations of chemicals. Note that the effect of chemicals on any material is influenced by a number of variable factors such as temperature, concentration, exposed area and duration. Many tests have been performed that use geomembranes and certain specific chemical mixtures. Naturally, however, every mixture of chemicals cannot be tested for, and various criteria may be used to judge performance. Reported performance ratings may not apply to all applications of a given material in the same chemical. Therefore, these ratings are offered as a guide only. This information is provided for reference purposes only and is not intended as a warranty or guarantee. GSE assumes no liability in connection with the use of this information.

Medium	Concentration	Resistance at: 20 °C (68 °F)	60 °C (140 °F)
A			
Acetic acid	100%	S	L
Acetic acid	10%	S	S
Acetic acid anhydride	100%	S	L
Acetone	100%	L	L
Adipic acid	sat. sol.	S	S
Allyl alcohol	96%	S	S
Aluminum chloride	sat. sol.	S	S
Aluminum fluoride	sat. sol.	S	S
Aluminum sulfate	sat. sol.	S	S
Alum	sol.	S	S
Ammonia, aqueous	dil. sol.	S	S
Ammonia, gaseous dry	100%	S	S
Ammonia, liquid	100%	S	S
Ammonium chloride	sat. sol.	S	S
Ammonium fluoride	sol.	S	S
Ammonium nitrate	sat. sol.	S	S
Ammonium sulfate	sat. sol.	S	S
Ammonium sulfide	sol.	S	S
Amyl acetate	100%	S	L
Amyl alcohol	100%	S	L
Aniline	100%	S	L
Antimony trichloride	90%	S	S
Arsenic acid	sat. sol.	S	S
Aqua regia	HCI-HNO3	U	U
B			
Barium carbonate	sat. sol.	S	S
Barium chloride	sat. sol.	S	S
Barium hydroxide	sat. sol.	S	S
Barium sulfate	sat. sol.	S	S
Barium sulfide	sol.	S	S
Benzaldehyde	100%	S	L
Benzene	—	L	L
Benzoic acid	sat. sol.	S	S
Beer	—	S	S
Borax (sodium tetraborate)	sat. sol.	S	S
Boric acid	sat. sol.	S	S
Bromine, gaseous dry	100%	U	U
Bromine, liquid	100%	U	U
Butane, gaseous	100%	S	S
1-Butanol	100%	S	S
Butyric acid	100%	S	L
C			
Calcium carbonate	sat. sol.	S	S
Calcium chlorate	sat. sol.	S	S
Calcium chloride	sat. sol.	S	S
Calcium nitrate	sat. sol.	S	S
Calcium sulfate	sat. sol.	S	S
Calcium sulfide	dil. sol.	L	L
Carbon dioxide, gaseous dry	100%	S	S
Carbon disulfide	100%	L	U
Carbon monoxide	100%	S	S
Chloracetic acid	sol.	S	S
Carbon tetrachloride	100%	L	U
Chlorine, aqueous solution	sat. sol.	L	U
Chlorine, gaseous dry	100%	L	U
Chloroform	100%	U	U
Chromic acid	20%	S	L
Chromic acid	50%	S	L
Citric acid	sat. sol.	S	S

Medium	Concentration	Resistance at: 20 °C (68 °F)	60 °C (140 °F)
Copper chloride	sat. sol.	S	S
Copper nitrate	sat. sol.	S	S
Copper sulfate	sat. sol.	S	S
Cresylic acid	sat. sol.	L	—
Cyclohexanol	100%	S	S
Cyclohexanone	100%	S	L
D			
Decahydronaphthalene	100%	S	L
Dextrine	sol.	S	S
Diethyl ether	100%	L	—
Dioctylphthalate	100%	S	L
Dioxane	100%	S	S
E			
Ethanediol	100%	S	S
Ethanol	40%	S	L
Ethyl acetate	100%	S	U
Ethylene trichloride	100%	U	U
F			
Ferric chloride	sat. sol.	S	S
Ferric nitrate	sol.	S	S
Ferric sulfate	sat. sol.	S	S
Ferrous chloride	sat. sol.	S	S
Ferrous sulfate	sat. sol.	S	S
Fluorine, gaseous	100%	U	U
Fluorosilicic acid	40%	S	S
Formaldehyde	40%	S	S
Formic acid	50%	S	S
Formic acid	98-100%	S	S
Furfuryl alcohol	100%	S	L
G			
Gasoline	—	S	L
Glacial acetic acid	96%	S	L
Glucose	sat. sol.	S	S
Glycerine	100%	S	S
Glycol	sol.	S	S
H			
Heptane	100%	S	U
Hydrobromic acid	50%	S	S
Hydrobromic acid	100%	S	S
Hydrochloric acid	10%	S	S
Hydrochloric acid	35%	S	S
Hydrocyanic acid	10%	S	S
Hydrofluoric acid	4%	S	S
Hydrofluoric acid	60%	S	L
Hydrogen	100%	S	S
Hydrogen peroxide	30%	S	L
Hydrogen peroxide	90%	S	U
Hydrogen sulfide, gaseous	100%	S	S
L			
Lactic acid	100%	S	S
Lead acetate	sat. sol.	S	—
M			
Magnesium carbonate	sat. sol.	S	S
Magnesium chloride	sat. sol.	S	S
Magnesium hydroxide	sat. sol.	S	S
Magnesium nitrate	sat. sol.	S	S
Maleic acid	sat. sol.	S	S
Mercuric chloride	sat. sol.	S	S

- Continued -

Medium	Concentration	Resistance at: 20 °C (68 °F)	60 °C (140 °F)
Mercuric cyanide	sat. sol.	S	S
Mercuric nitrate	sol.	S	S
Mercury	100%	S	S
Methanol	100%	S	S
Methylene chloride	100%	L	—
Milk	—	S	S
Molasses	—	S	S
N			
Nickel chloride	sat. sol.	S	S
Nickel nitrate	sat. sol.	S	S
Nickel sulfate	sat. sol.	S	S
Nicotinic acid	dil. sol.	S	—
Nitric acid	25%	S	S
Nitric acid	50%	S	U
Nitric acid	75%	U	U
Nitric acid	100%	U	U
O			
Oils and Grease	—	S	L
Oleic acid	100%	S	L
Orthophosphoric acid	50%	S	S
Orthophosphoric acid	95%	S	L
Oxalic acid	sat. sol.	S	S
Oxygen	100%	S	L
Ozone	100%	L	U
P			
Petroleum (kerosene)	—	S	L
Phenol	sol.	S	S
Phosphorus trichloride	100%	S	L
Photographic developer	cust. conc.	S	S
Picric acid	sat. sol.	S	—
Potassium bicarbonate	sat. sol.	S	S
Potassium bisulfide	sol.	S	S
Potassium bromate	sat. sol.	S	S
Potassium bromide	sat. sol.	S	S
Potassium carbonate	sat. sol.	S	S
Potassium chlorate	sat. sol.	S	S
Potassium chloride	sat. sol.	S	S
Potassium chromate	sat. sol.	S	S
Potassium cyanide	sol.	S	S
Potassium dichromate	sat. sol.	S	S
Potassium ferricyanide	sat. sol.	S	S
Potassium ferrocyanide	sat. sol.	S	S
Potassium fluoride	sat. sol.	S	S
Potassium hydroxide	10%	S	S
Potassium hydroxide	sol.	S	S
Potassium hypochlorite	sol.	S	L
Potassium nitrate	sat. sol.	S	S
Potassium orthophosphate	sat. sol.	S	S
Potassium perchlorate	sat. sol.	S	S
Potassium permanganate	20%	S	S
Potassium persulfate	sat. sol.	S	S
Potassium sulfate	sat. sol.	S	S
Potassium sulfite	sol.	S	S
Propionic acid	50%	S	S
Propionic acid	100%	S	L
Pyridine	100%	S	L
Q			
Quinol (Hydroquinone)	sat. sol.	S	S
S			
Salicylic acid	sat. sol.	S	S
Silver acetate	sat. sol.	S	S
Silver cyanide	sat. sol.	S	S
Silver nitrate	sat. sol.	S	S
Sodium benzoate	sat. sol.	S	S
Sodium bicarbonate	sat. sol.	S	S
Sodium biphosphate	sat. sol.	S	S
Sodium bisulfite	sol.	S	S
Sodium bromide	sat. sol.	S	S
Sodium carbonate	sat. sol.	S	S
Sodium chlorate	sat. sol.	S	S
Sodium chloride	sat. sol.	S	S
Sodium cyanide	sat. sol.	S	S
Sodium ferricyanide	sat. sol.	S	S
Sodium ferrocyanide	sat. sol.	S	S
Sodium fluoride	sat. sol.	S	S
Sodium hydroxide	40%	S	S
Sodium hydroxide	sat. sol.	S	S
Sodium hypochlorite	15% active chlorine	S	S
Sodium nitrate	sat. sol.	S	S
Sodium nitrite	sat. sol.	S	S
Sodium orthophosphate	sat. sol.	S	S
Sodium sulfate	sat. sol.	S	S
Sodium sulfide	sat. sol.	S	S
Sulfur dioxide, dry	100%	S	S
Sulfur trioxide	100%	U	U
Sulfuric acid	10%	S	S
Sulfuric acid	50%	S	S
Sulfuric acid	98%	S	U
Sulfuric acid	fuming	U	U
Sulfurous acid	30%	S	S
T			
Tannic acid	sol.	S	S
Tartaric acid	sol.	S	S
Thionyl chloride	100%	L	U
Toluene	100%	L	U
Triethylamine	sol.	S	L
U			
Urea	sol.	S	S
Urine	—	S	S
W			
Water	—	S	S
Wine vinegar	—	S	S
Wines and liquors	—	S	S
X			
Xylenes	100%	L	U
Y			
Yeast	sol.	S	S
Z			
Zinc carbonate	sat. sol.	S	S
Zinc chloride	sat. sol.	S	S
Zinc (II) chloride	sat. sol.	S	S
Zinc (IV) chloride	sat. sol.	S	S
Zinc oxide	sat. sol.	S	S
Zinc sulfate	sat. sol.	S	S

Specific immersion testing should be undertaken to ascertain the suitability of chemicals not listed above with reference to special requirements.

NOTES:

(S) Satisfactory: *Liner material is resistant to the given reagent at the given concentration and temperature. No mechanical or chemical degradation is observed.*

(L) Limited Application Possible: *Liner material may reflect some attack. Factors such as concentration, pressure and temperature directly affect liner performance against the given media. Application, however, is possible under less severe conditions, e.g. lower concentration, secondary containment, additional liner protections, etc.*

(U) Unsatisfactory: ***Liner material is not resistant to the given reagent at the given concentration and temperature. Mechanical and/or chemical degradation is observed.***

(–) Not tested

sat. sol. = *Saturated aqueous solution, prepared at 20°C (68°F)*

sol. = *aqueous solution with concentration above 10% but below saturation level*

dil. sol. = *diluted aqueous solution with concentration below 10%*

cust. conc. = *customary service concentration*

TN032 ResistChart R03/17/06

North America	GSE Lining Technology, Inc.	Houston, Texas	800 435 2008	281 443 8564	Fax: 281 230 8650
South America	GSE Lining Technology Chile S.A.	Santiago, Chile		56 2 595 4200	Fax: 56 2 595 4290
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