

WC-W28TH REALTY

MANHATTAN, NEW YORK

Remedial Action Report

NYC VCP Project Number: 14CVCP241M

OER Project Number: 14EHAN086M

NYSDEC Spill Numbers: 13-06369, 15-04458

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REMEDIAL ACTION REPORT

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LIST OF ACRONYMS

Acronym	Definition
CAMP	Community Air Monitoring Plan
DER-10	NYS DEC Division of Environmental Remediation Technical Guidance Manual 10
EC	Engineering Control
HASP	Health and Safety Plan
IC	Institutional Control
NYC VCP	New York City Voluntary Cleanup Program
NYC DEP	New York City Department of Environmental Protection
NYC DOHMH	New York City Department of Health and Mental Hygiene
NYC OER	New York City Office of Environmental Remediation
ORC	Oxygen Release Compound
PID	Photoionization Detector
QA/QC	Quality Assurance/Quality Control
QEP	Qualified Environmental Professional
RAR	Remedial Action Report
RAWP	Remedial Action Work Plan
SCG	Standards, Criteria and Guidance
SCO	Soil Cleanup Objective
SMMP	Soil/Materials Management Plan
SMP	Site Management Plan
SVOCs	Semi-Volatile Organic Compounds
UST	Underground Storage Tank
VOCs	Volatile Organic Compounds

CERTIFICATION

I, Joseph M. Lenaro, PE, certify the following:

- I am currently a registered professional engineer licensed by the State of New York.
- I performed professional engineering services and had primary direct responsibility for implementation of the remedial program for the WC-W28th REALTY (527 West 27th Street) site, site number 14CVC241M.
- I have reviewed this document, to which my signature and seal are affixed.
The vapor barrier and composite cover system constructed during this remedial action were professionally observed by me or by a person under my direct supervision are accurately reflected in the text and drawings for as-built design reported in this Remedial Action Report.
- The OER-approved Remedial Action Work Plan dated July 7, 2014 and Stipulations in a letter dated September 3, 2017 were implemented and that all requirements in those documents have been substantively complied with. I certify that contaminated soil, fill, liquid or other material from the property was taken to facilities licensed to accept this material in full compliance with applicable laws and regulations.

Name

Joseph M. Lenaro

PE License Number

Signature

Date

PE Stamp

I, Kevin P. McGrath, PG, CPG, certify the following:

- I am a Qualified Environmental Professional. I had primary direct responsibility for implementation of the remedial program for the
- WC-W28th REALTY (527 West 27th Street) site, site number 14CVC241M.
- .
- The OER-approved Remedial Action Work Plan dated July 7, 2014 and Stipulations in a letter dated September 3, 2107 were implemented and that all requirements in those documents have been substantively complied with. I certify that contaminated soil, fill, liquid or other material from the property was taken to facilities licensed to accept this material in full compliance with applicable laws and regulations.

QEP Name

Kevin P. McGrath

QEP Signature

Date

EXECUTIVE SUMMARY

WC-W28 Realty, LLC has enrolled in the New York City Voluntary Cleanup Program (NYC VCP) to investigate and remediate a property located at 525-531 West 27th and 526-532 West 28th Streets in the West Chelsea neighborhood of Manhattan, New York. A Remedial Investigation (RI) was performed to compile and evaluate data and information necessary to develop a Remedial Action Work Plan (RAWP). A remedial action was performed pursuant to an OER-approved RAWP in a manner that has rendered the Site protective of public health and the environment consistent with the proposed use of the property. This RAR describes the remedial action performed under the RAWP. The remedial action described in this document provides for the protection of public health and the environment, complies with applicable environmental standards, criteria and guidance and applicable laws and regulations.

Site Location and Background

The Site is located at 525-531 West 27th Street & 526-532 West 28th Street, Manhattan in the Highline/West Chelsea District of Manhattan, New York and is identified as Block 699, Lot 49 on the New York City Tax Map.

The Site is 19,256-square feet and is bounded by: West 28th Street to the north; West 27th Street to the south; a newly constructed 8-story residential/commercial building to the east; and a three-story former night club to the west.

The Site formerly consisted of a single-story slab on grade commercial warehouse building abutting a four-story building with partial basement. The Site was most recently used as a Cabaret/Night Club but has been unoccupied for several years.

Summary of Redevelopment Plan

The redeveloped Site consists of high-rise town home/condominium style residential use building with floor level and sub-grade commercial uses. The current zoning designation is C6-3. The new use is consistent with existing zoning for the property.

The existing on-site structures were demolished and replaced with new structures specifically designed and constructed for the intended use. The first floor and first sub-grade level are used for commercial storefronts with a second sub-grade level consisting of an underground parking facility for the residents. Subsurface spaces consist of a full cellar and a full sub-cellar floors devoted to residential amenity spaces, parking, storage and mechanical systems, as well as retail spaces used in conjunction with ground floor retail spaces.

Grade level uses include retail spaces, lobbies, indoor garden spaces, access drive to underground garage and ancillary spaces such as storage, egress stairs and interior corridors. The upper levels (second floor and higher) consist of residential units.

There is a one-story base building covering the entire lot. Above the second floor the development is divided into two towers, one fronting 28th Street and one fronting 27th Street. Each tower rises a total of 10 stories above the one-story base (11 stories total above grade) and is 135 feet tall. Total gross square footage including cellars is approximately 135,000 sf. The 27th Street tower has a footprint of 52 feet x 46 feet before setbacks and accommodates one apartment per floor, for a total of 10 units. The 28th Street tower has a footprint of 75 feet x 100 feet, and accommodates three or four apartments per floor for a total of 32 units. The two towers accommodate a total of 42 residential units.

The new building covers the entire footprint of the property and there are no grade level open-air space or landscaped areas. As part of development, the entire Site was excavated 26 feet below grade for the new cellar and sub-cellar levels. Additional excavation for the elevator pit/detention tank/ etc. took place to 31 feet below grade. A total of 30,011 tons of soil was excavated and removed from the Site. The groundwater table is approximately 11-feet below grade at the Site and dewatering was required during construction.

Summary of Description of Surrounding Property

The Site is located in the historical West Chelsea manufacturing district. The surrounding properties consist of a mixture of residential, commercial, offices, and light industrial uses.

Immediately to the north (Across 28th street) is a newly constructed 31-story residential apartment complex with at-grade retail spaces, to the east is a newly constructed 21-story residential apartment complex with at-grade commercial spaces, to the south across 27th street is a row of multi-story buildings containing a mix of at-grade commercial spaces, offices, a hotel, and apartments, and to the west is a three story night-club. There are no known sensitive receptors located within 500 feet of the Site.

Summary of Past Site Uses and Areas of Concern

A Phase I Environmental Site Assessment was performed by Chazen in April 2013. The Site was developed in 1916 and occupied by E.R. Merrill Spring Company, a manufacturer of automobile springs/parts and parts for Sherman Tanks. Historical site uses included a truck terminal garage, warehouse and foundry. After E.R. Merrill-Spring Co. and various subsequent subsidiaries (1980), the Site was occupied as a warehouse for storage and construction of theatrical props and scenery and was reportedly used as a studio for filming. From 1998 to 2002 the building was used as a warehouse for a packaging supply company. In 2002, the Site was renovated into its most recent configuration and used as a night club/Cabarets.

The AOCs identified for the Site include:

1. Historical use of the property including manufacturer of auto parts and a foundry.
2. Extensive historical use of urban-fill filling during development and redevelopment
3. Releases of petroleum to on-site soils and groundwater identified and reported on two occasions;

Spill 1303669 reported September 17, 2013: discovered in soil borings adjacent to and beneath vaulted fuel-oil AST; administratively closed by NYSDEC on 12/10/13

Spill 1504458 was reported July 27, 2015 when oil was observed weeping through seams in the sheet pile wall in the southwest corner of the excavation. Spill determined to be from adjacent site and closed 02/01/16.

Summary of the Work Performed under the Remedial Investigation

On behalf of WC-W28th Realty, Chazen has performed the following scope of work:

1. May 2013: Conducted a Site inspection to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);
2. Sept 2013: Installed nine soil borings across the entire project Site, and collected 22 soil samples for chemical analysis from the soil borings to evaluate soil quality;
3. Sep 2013: Installed four groundwater monitoring wells throughout the Site to establish groundwater flow and collected four screening-level groundwater samples for chemical analysis to evaluate groundwater quality;
4. Sept 2013: Installed six soil vapor probes around Site perimeter and collected four sub-slab, one indoor, and one ambient air samples for chemical analysis; and,
5. Apr 2014: Conducted a XRF study based on the initial RI study.

Summary of Findings of Remedial Investigation

1. Elevation of the property ranges from 11 to 14 feet Above Mean Sea Level;
2. Depth to groundwater ranges from 9.5 to 11.5 feet below grade at the Site;
3. Groundwater flow is generally from east-northeast to west-southwest beneath the Site;
4. Depth to bedrock is approximately 21-24 feet below ground surface at the Site;
5. The stratigraphy of the site, from the surface down, consists of approximately 6.5 feet of urban fill underlain by 15-17 feet of fine sand, silt, and gravel, on top of Manhattan Schist;
6. Soil/fill samples results collected during the RI were compared to New York State Department of Environmental Conservation (NYSDEC) Unrestricted Use Soil Cleanup Objectives and Restricted Residential Use Soil Cleanup Objectives (SCOs) as presented in 6NYCRR Part 375-6.8 and CP51. Soil/fill samples collected during the RI showed one VOC, acetone (max. 0.084 mg/kg), above Unrestricted Use SCOs. Several SVOCs consisting of Polycyclic Aromatic Hydrocarbons (PAHs) were detected with benzo(k)fluoranthene (0.914 mg/kg), chrysene (1.20

mg/kg), and 3- & 4-Methylphenols (max. 4.70 mg/kg) exceeding Unrestricted Use SCOs in two shallow samples and one deep sample; benzo(a)anthracene (max 5.50 mg/kg), benzo(a)pyrene (max 4.59 mg/kg), benzo(b)-fluoranthene (max 3.65 mg/kg), dibenz(a,h)anthracene (max 1.87 mg/kg), and indeno(1,2,3-cd)pyrene (max 0.611 mg/kg) exceeded Restricted Residential Use SCOs in four shallow soil samples. Metals including arsenic (max. 384 mg/kg), barium (max. 957 mg/kg), cadmium (6.02 mg/kg), copper (max. 440 mg/kg), lead (max. 13,400 mg/kg), nickel (max. 42.5 mg/kg), mercury (max. of 10.1 mg/kg) and zinc (max. of 1900 mg/kg) exceeded Unrestricted Use SCOs in seven of the eight shallow samples and two out of eleven deep soil samples. Of these metals, arsenic, barium, copper, lead, and mercury also exceeded Restricted Residential SCOs. The greatest concentrations of mercury and lead detected in the RI were reported in the 0-4 foot interval in two of the soil borings (SB-1 and SB-2), indicating a potential shallow hotspot area. The XRF study delineated an area of approximately 600 ft² between SB-1 and SB2 with potentially hazardous concentrations of total lead in the soils. The results of the XRF survey also identified a second area approximately 600 ft² with lead concentrations that did exceed the hazardous waste criteria by TCLP analysis. No metals were detected in any of the deeper soil samples (> 14 feet below grade). PCBs and Pesticides were not tested during this investigation

7. Groundwater sample results from the RI were compared to New York State 6NYCRR Part 703.5 Class GA groundwater quality standards (GQS). Groundwater samples collected during the RI showed no SVOCs above their respective GQS. Three VOCs, cis-1,2-dichloroethylene (max. 120 µg/L), methyl tert-butyl ether (MTBE) (15 µg/L), and vinyl chloride (max. 3.0 µg/L) were detected in two groundwater samples above their respective GQS. Several metals were identified in groundwater, but only aluminum (max. 125,000 µg/L), magnesium (135,000 µg/L), manganese (3,820 µg/L), and sodium (max. 232,000) exceeded their respective GQS in all five samples. An apparent plume originating off-site and extending from the NE corner of the site toward the west-southwest boundary was detected;

8. Soil vapor samples collected during the RI were compared to the compounds listed in Table 2.1 Air Guideline Values Derived by the NYSDOH located in the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion dated October 2006. Soil vapor samples collected during the RI showed petroleum and chlorinated VOCs at generally low concentrations. The total concentration of petroleum-related VOCs (BTEX) ranged from 7.1 $\mu\text{g}/\text{m}^3$ to 34.8 $\mu\text{g}/\text{m}^3$. 1,1,1-trichloroethane (TCA) was detected in two out of four soil vapor samples with a maximum concentration of 27 $\mu\text{g}/\text{m}^3$. Carbon tetrachloride was detected in all four soil vapor samples with a maximum concentration of 0.73 $\mu\text{g}/\text{m}^3$. Tetrachloroethene (PCE) was detected in all four samples with a maximum concentration of 7.9 $\mu\text{g}/\text{m}^3$. Trichloroethene (TCE) was detected in all four samples with a maximum concentration of 17 $\mu\text{g}/\text{m}^3$. The TCE compound was detected within the monitoring range established within the NYSDOH Final Guidance on Soil Vapor Intrusion.

Summary of the Remedial Action

The remedial action described below achieved protection of public health and the environment for the intended use of the property. The remedial action achieved all of the remedial action objectives established for the project and addressed applicable standards, criterion, and guidance; was effective in both the short-term and long-term and reduced mobility, toxicity and volume of contaminants; was cost effective and implementable; and used standards methods that are well established in the industry.

A summary of the milestones achieved in the Remedial Action is as follows: A Pre-Application Meeting was held on August, 13, 2013. A Remedial Investigation (RI) was performed from September 2013 through April 2014. A RI Report was prepared to evaluate data and information necessary to develop a Remedial Action Work Plan (RAWP). A Site Contact List was established. A draft RAWP was prepared and released with a Fact Sheet on July 7, 2014 for a 30-day public comment period. The RAWP and Stipulation List dated September 12, 2014 was approved by the New York City Office of Environmental Remediation (OER) on September 25, 2014. Site briefings was conducted with New York State Department of Environmental Conservation (NYSDEC) on December 12, 2013 and

March 31, 2014. A Pre-Construction meeting was held on September 18, 2014. The remedial action was begun on November 17, 2014 and completed on August 26, 2016.

The remedial action consisted of the following tasks:

1. Prepared a Community Protection Statement and implemented a Citizen Participation Plan.
2. Mobilized site security and equipment; completed utility mark outs; and marked and staked excavation areas;
3. Impacted soils were screened using X-Ray Fluorescence for quantification of selected heavy metals to differentiate potentially hazardous materials for proper segregation, handling, and off-site disposal. Three five-point post-excavation confirmatory soil samples (one for each 2,500 ft²) of impacted area) were collected for analysis upon achievement of action levels to confirm removal of hazardous materials.
4. Performed Waste Characterization Study prior to excavation activities. Fifteen waste characterization soil samples were collected on September 22-23, 2014. Waste characterization samples were collected at a frequency dictated by disposal facility(s).
5. Performed a Community Air Monitoring Program for particulates and volatile organic carbon compounds.
6. Selected NYSDEC Part 375 Unrestricted Use Track 1 Soil Cleanup Objectives (SCOs).
7. The following excavation were performed: Excavation and removal of all on-site overburden from grade to bedrock (at 19-23 feet below grade) and removal of bedrock to 26 feet below grade. All on-site soil/fill was removed from the Site. A phased removal action was performed so that all soils exhibiting hazardous waste criteria were excavated with post-removal confirmatory sampling, followed by the removal of all urban fill soils, then residual petroleum contaminated or metals impacted native soils (PCS) beneath the fill, then "clean:" native soils to bedrock, and then bedrock to the final planned depth.
8. A total of 30,011 tons of soil/fill was excavated and removed from the property.

- a. 1,468.61 tons of hazardous soil/fill was excavated and transported it to Clean Earth of New Jersey, 115 Jacobus Avenue, Kearney.
 - b. 14,855.61 tons of urban fill was excavated and and transported to Impact Environmental, Former NJ Zinc PHASE III Site, 1120 Mauch Chunk Rd., Palmerton, PA.
 - c. 10,528.98 tons of characteristic non-hazardous and petroleum impacted soil was excavated and transported to Bayshore Soil Management, LLC, 75 Crows Mill Road, Keasbey, NJ.
 - d. 2,258.82 tons of characteristic non-hazardous soil was excavated and transported to Total Recycling Corp, 1820 North Dauphin Rd., Allentown, PA
 - e. 336,88 tons of characteristic non-hazardous soil (meeting NJ Res-contact criteria) was excavated and transported to Impact Environmental, Lyndhurst Facility, 100 Page Avenue, Lyndhurst, NJ.
9. Screened excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID.
 10. Conducted materials management of excavated materials including temporarily stockpiling and segregating in accordance with defined material types and to prevent co-mingling of contaminated material and non-contaminated materials.
 11. Appropriately segregated excavated media onsite prior to disposal.
 12. Transported and disposed all soil/fill material at permitted facilities in accordance with all applicable laws and regulations for handling, transporting, and disposing, and the RAWP.
 13. Post-excavation confirmation samples were not collected nor possible from the base of the site-wide excavation as the excavation was extended into competent bedrock and no soils remained on-site. Therefore, Track 1 SCOs were achieved.
 14. Post-excavation confirmation and/or documentation samples of the sidewalls of the excavations were not collected nor possible. The Site is ringed by a steel sheet pile barrier wall along the property boundary making access to the side wall soils impossible.

15. Discovery and removal of three previously undetected, unregistered 1,000 gallon USTs. Tank 1 and 2, located in grid area B-1, were clean, empty, in excellent condition, with no evidence of impacted soil or leaks. Tank 3 in grid area C-5 was badly pitted, contained oily sludge, and soils surrounding tank were impacted. Tank 3 subsequently determined to be source of Spill 1306369. (Spill 1306369 was reported in May 2013 and closed in December 2013).
16. Excavation and removal of an estimated 260-300 tons of petroleum impacted soils (included in total shipments to Bayshore) associated with Tank 3 in compliance with applicable local, State and Federal laws and regulations.
17. Discovery and reporting of petroleum spill 1504458 on July 27, 2015, identified when free-phase fuel oil was observed weeping through the seams of the sheet pile wall in the southwest corner of the site excavation. The spill appeared to be associated with historical underground storage tanks beneath the floor of the adjacent building to the west. NYSDEC closed the spill on February 1, 2016.
18. Installed a sheet pile barrier wall along the four property boundaries from grade to bedrock to minimize groundwater infiltration during the excavation, removal, and subsequent construction phases of the project.
19. Installed a groundwater recovery sump to dewater the site during the excavation and construction phases of the project. Operated the groundwater recovery and treatment system until dewatering was no longer required. A total of 1,392,000 gallons of groundwater was removed, processed through a DEP pre-treatment liquid phase carbon treatment plant, and discharged under permit to the City of New York Sewer System.
20. As part of development, installed a vapor barrier system beneath the building slab and behind foundation walls of the new building. The vapor barrier/waterproofing membrane on the pre-concrete installation blindside sub-slab and verticals (east and west walls) consists of Grace Preprufe 160R (0.8 mm) with Bituthene 4000 (1.5 mm) used for post concrete installation verticals (north and south walls) The contractor for the Vapor Barrier System construction was ACA Contracting, Inc.

21. Performed all activities required for the Remedial Action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations.
22. Implemented storm-water pollution prevention measures in compliance with applicable laws and regulations.
23. Imported clean structural fill materials to be used as backfill between the barrier walls and building foundation walls in compliance with the Remedial Action Work Plan and in accordance with applicable laws and regulations.
24. Submitted daily reports during soil removal oversight activities. Daily reports were submitted from November 17, 2017 through March 10, 2015 for each day that hazardous or petroleum impacted soils were excavated and/or removed.
25. Submitted weekly inspection/progress reports from March 10, 2015 through June 30, 2015 during removal of clean soils and/or shot rock.
26. Submitted periodic inspection reports From June 2015 through August 2015 when mud slab installation completed and all earth moving equipment removed from the site.
27. Submitted a Sustainability Report.
28. Submitted this RAR that describes the Remedial Action; certifies that the remedial requirements defined in the RAWP have been achieved; defines the Site boundaries; and lists any changes from the RAWP.

REMEDIAL ACTION REPORT

1.0 SITE BACKGROUND

WC-W28 Realty, LLC has enrolled in the New York City Voluntary Cleanup Program (NYC VCP) to investigate and remediate a property located at 525-531 West 27th and 526-532 West 28th Streets in the West Chelsea section of Manhattan, New York. The boundary of the property subject to this Remedial Action is shown in Figure 1 and include, in their entirety, Manhattan Block 699, Lot 49. The Remedial Action was performed pursuant to the OER-approved RAWP in a manner that has rendered the property protective of public health and the environment consistent with its intended use. This RAR describes the remedial action performed under the RAWP. The remedial action described in this document provides for the protection of public health and the environment, complies with applicable environmental standards, criteria and guidance and applicable laws and regulations.

1.1 SITE LOCATION AND BACKGROUND

The Site is located at 525-531 West 27th Street & 526-532 West 28th Street, Manhattan in the Highline/West Chelsea District of Manhattan, New York and is identified as Block 699, Lot 49 on the New York City Tax Map. A Site Location Map is included as **Figure 1a**.

The Site is 19,256-square feet and is bounded by: West 28th Street to the north; West 27th Street to the south; a newly constructed 8-story residential/commercial building to the east; and a three-story former night club to the west.

The Site formerly consisted of a single-story slab-on-grade commercial warehouse building abutting a four-story building with partial basement. The Site was most recently used as a Cabaret/Night Club but had been unoccupied for the past several years.

1.2 REDEVELOPMENT PLAN

The redeveloped Site consists of a high-rise town home/condominium style residential use building with floor-level and sub-grade commercial uses. The layout of the

redeveloped site is presented in **Figure 3**. The current zoning designation is C6-3 (see Zoning Map, Section 8b). The use of the redeveloped site is consistent with this zoning designation.

Previously existing on-site structures were demolished and replaced with new structures specifically designed and constructed for the intended use. The first floor and first sub-grade level is used for commercial storefronts with a second sub-grade level consisting of an underground parking facility for the residents. The upper levels (second floor and higher) contain residential units.

There is a one-story base building covering the entire lot. Above the second floor the development is divided into two towers, one fronting 28th Street and one fronting 27th Street. Each tower rises a total of 10 stories above the one-story base (11 stories total above grade) and is 135 feet tall. Total gross square footage including cellars is approximately 135,000 sf. The 27th Street tower has a footprint of 52 feet x 46 feet before setbacks and accommodates one apartment per floor, for a total of 10 units. The 28th Street tower has a footprint of 75 feet x 100 feet, and accommodates three or four apartments per floor for a total of 32 units. The two towers accommodate a total of 42 residential units.

The development included excavation across the entire Site to 26 feet for the cellar and sub-cellar levels with an additional 5 feet of excavation for the elevator pits.

A total of 30,011 tons of soil was excavated and removed from the Site. The groundwater table is approximately 11 feet below grade at the Site and dewatering was required during construction. Subsurface spaces consist of cellar and sub-cellar floors devoted to residential amenity spaces, parking, storage and mechanical systems, as well as retail spaces used in conjunction with ground floor retail spaces. Grade level uses include retail spaces, lobbies, garden spaces, access drive and ancillary spaces such as storage, egress stairs and corridors.

1.3 DESCRIPTION OF SURROUNDING PROPERTY

Immediately to the north (Across 28th street) is a newly constructed 31-story residential apartment complex with at-grade retail spaces, to the east is a newly constructed 21-story residential apartment complex with at-grade commercial spaces, to the south across 27th street is a row of multi-story buildings containing a mix of at-grade commercial spaces, offices, a hotel, and apartments, and to the west is a three story night-club. There are no known sensitive receptors located within 500 feet of the Site.

1.4 SUMMARY OF PAST USES AND AREAS OF CONCERN

A Phase I Environmental Site Assessment was performed by Chazen in April 2013. The Site was originally developed in 1916 and occupied by E.R. Merrill Spring Company, a manufacturer of automobile springs/parts and parts for Sherman Tanks. Historical site uses included a truck terminal garage, warehouse and foundry. After E.R. Merrill-Spring Co. and various subsequent subsidiaries (1980), the Site was occupied as a warehouse for storage and construction of theatrical props and scenery and was reportedly used as a studio for filming. From 1998 to 2002 the building was used as a warehouse for a packaging supply company. In 2002, the Site was renovated into its most recent configuration and used as Night Clubs/Cabarets.

Areas of Concern (AOCs) included:

1. Suspected presence of historic fill material up to 6 to 8 feet below grade
2. Evidence of a potential historical petroleum release associated with a vaulted fuel-oil AST in the basement at 532 W 28th Street . Odors, staining, and elevated PID measurements were detected in soil borings beneath the vault and alongside the exterior wall. It was reported to NYSDEC and Spill 1306369 was assigned to the Site. No evidence of petroleum impacts that exceeded NYSDEC CP-51 Petroleum Contaminated Soil Clean-up Standards were reported by the laboratory. Spill 1306369 was closed by NYSDEC 12/10/13.
3. Prior uses of the site as foundries/metalworking (blacksmith) shop and manufacturer of auto parts.

4. Spill 1504458 was discovered on July 27, 2015 and reported to NSYDEC. Apparent free-phase product was observed weeping through the seams of the sheet pile barrier wall from beneath the adjacent building to the west of the site. The spill was determined to be associated with underground storage tanks beneath the floor of the adjacent property and the spill was closed on 2/1/16.

1.5 Summary of Work Performed under Remedial Investigation

On behalf of WC-W28th Realty, Chazen performed the following scope of work at the site:

1. April 2013: Conducted a Site inspection to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);
2. May 2013: Installed nine soil borings across the entire project Site, and collected 22 soil samples for chemical analysis from the soil borings to evaluate soil quality;
3. May 2013: Installed four groundwater monitoring wells throughout the Site to establish groundwater flow and collected four groundwater samples for chemical analysis to evaluate groundwater quality;
4. May 2013: Installed six sub-slab soil vapor probes around Site perimeter and collected five sub-slab vapor samples (one probe location was beneath the water table), one indoor and one ambient air sample for chemical analysis; and
5. March 2015: Conducted an XRF study based on the initial RI study.

1.6 SUMMARY OF FINDINGS OF REMEDIAL INVESTIGATION

1. Elevation of the property ranges from 11 to 14 feet Above Mean Sea Level;
2. Depth to groundwater ranges from 9.5 to 11.5 feet below grade at the Site;
3. Groundwater flow is generally from east-northeast to west-southwest beneath the Site;
4. Depth to bedrock is approximately 19-22 feet below ground surface at the Site;

5. The stratigraphy of the site, from the surface down, consists of approximately 6.5 feet of urban fill underlain by 13-17 feet of fine sand, silt, and gravel, on top of Manhattan Schist;
6. Soil/fill samples results collected during the RI were compared to New York State Department of Environmental Conservation (NYSDEC) Unrestricted Use Soil Cleanup Objectives and Restricted Residential Use Soil Cleanup Objectives (SCOs) as presented in 6NYCRR Part 375-6.8 and CP51. Soil/fill samples collected during the RI showed one VOC, acetone (max. 0.084 mg/kg), above Unrestricted Use SCOs. Several SVOCs consisting of Polycyclic Aromatic Hydrocarbons (PAHs) were detected with benzo(k)fluoranthene (0.914 mg/kg), chrysene (1.20 mg/kg), and 3- & 4-Methylphenols (max. 4.70 mg/kg) exceeding Unrestricted Use SCOs in two shallow samples and one deep sample; benzo(a)anthracene (max 5.50 mg/kg), benzo(a)pyrene (max 4.59 mg/kg), benzo(b)-fluoranthene (max 3.65 mg/kg), dibenz(a,h)anthracene (max 1.87 mg/kg), and indeno(1,2,3-cd)pyrene (max 0.611 mg/kg) exceeded Restricted Residential Use SCOs in four shallow soil samples. Metals including arsenic (max. 384 mg/kg), barium (max. 957 mg/kg), cadmium (6.02 mg/kg), copper (max. 440 mg/kg), lead (max. 13,400 mg/kg), nickel (max. 42.5 mg/kg), mercury (max. of 10.1 mg/kg) and zinc (max. of 1900 mg/kg) exceeded Unrestricted Use SCOs in seven of the eight shallow samples and two out of eleven deep soil samples. Of these metals, arsenic, barium, copper, lead, and mercury also exceeded Restricted Residential SCOs. The greatest concentrations of mercury and lead detected in the RI were reported in the 0-4 foot interval in two of the soil borings (SB-1 and SB-2), indicating a potential shallow hotspot area. The XRF study delineated an area of approximately 600 ft² between SB-1 and SB2 with potentially hazardous concentrations of total lead in the soils. The results of the XRF survey also identified a second area approximately 600 ft² with lead concentrations that did exceed the hazardous waste criteria by TCLP analysis. No metals were detected in any of the deeper soil samples (> 14 feet below grade). PCBs and Pesticides were not tested during this investigation
7. Groundwater sample results from the RI were compared to New York State 6NYCRR Part 703.5 Class GA groundwater quality standards (GQS). Groundwater samples collected during the RI showed no SVOCs above their respective GQS. Three VOCs,

cis-1,2-dichloroethylene (max. 120 µg/L), methyl tert-butyl ether (MTBE) (15 µg/L), and vinyl chloride (max. 3.0 µg/L) were detected in two groundwater samples above their respective GQS. Several metals were identified in groundwater, but only aluminum (max. 125,000 µg/L), magnesium (135,000 µg/L), manganese (3,820 µg/L), and sodium (max. 232,000) exceeded their respective GQS in all five samples. An apparent plume originating off-site and extending from the NE corner of the site toward the west-southwest boundary was detected;

8. Soil vapor samples collected during the RI were compared to the compounds listed in Table 2.1 Air Guideline Values Derived by the NYSDOH located in the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion dated October 2006. Soil vapor samples collected during the RI showed petroleum and chlorinated VOCs at generally low concentrations. The total concentration of petroleum-related VOCs (BTEX) ranged from 7.1 µg/m³ to 34.8 µg/m³. 1,1,1-trichloroethane (TCA) was detected in two out of four soil vapor samples with a maximum concentration of 27 µg/m³. Carbon tetrachloride was detected in all four soil vapor samples with a maximum concentration of 0.73 µg/m³. Tetrachloroethene (PCE) was detected in all four samples with a maximum concentration of 7.9 µg/m³. Trichloroethene (TCE) was detected in all four samples with a maximum concentration of 17 µg/m³. The TCE compound was detected within the monitoring range established within the NYSDOH Final Guidance on Soil Vapor Intrusion.

2.0 DESCRIPTION OF REMEDIAL ACTIONS

The remedial action was performed in accordance with an OER approved Remedial Action Work Plan and achieved the remedial action objectives established for the project. The remedial action was evaluated in an alternatives analysis and was determined to be protective of human health and the environment, compliant with standards, criteria, and guidelines (SCGs), effective in the short-term, effective in the long-term, capable of attaining appropriate levels of reduction of toxicity, mobility, or volume of contaminated material, implementable, cost effective, acceptable to the community, consistent with land uses, and sustainable.

A summary of the milestones achieved in the Remedial Action is as follows: A Pre-Application Meeting was held on August, 13, 2013. A Remedial Investigation (RI) was performed from September 2013 through April 2014. A RI Report was prepared to evaluate data and information necessary to develop a Remedial Action Work Plan (RAWP). A Site Contact List was established. A draft RAWP was prepared and released with a Fact Sheet on July 7, 2014 for a 30-day public comment period. The RAWP and Stipulation List dated September 12, 2014 was approved by the New York City Office of Environmental Remediation (OER) on September 25, 2014. Site briefings were conducted with New York State Department of Environmental Conservation (NYSDEC) on December 12, 2013 and March 31, 2014. A Pre-Construction meeting was held on September 18, 2014. The remedial action was begun on November 17, 2014 and completed on August 26, 2016.

The remedial action consisted of the following tasks:

1. Prepared a Community Protection Statement and implemented a Citizen Participation Plan.
2. Mobilized site security and equipment; completed utility mark outs; and marked and staked excavation areas;
3. Impacted soils were screened using X-Ray Fluorescence for quantification of selected heavy metals to differentiate potentially hazardous materials for proper segregation, handling, and off-site disposal. Three five-point post-excavation confirmatory soil samples (one for each 2,500 ft²) of impacted area) were collected for analysis upon

achievement of action levels to confirm removal of hazardous materials.

4. Performed Waste Characterization Study prior to excavation activities. Fifteen waste characterization soil samples were collected on September 22-23, 2014. Waste characterization samples were collected at a frequency dictated by disposal facility(s).
5. Performed a Community Air Monitoring Program for particulates and volatile organic carbon compounds.
6. Selected NYSDEC Part 375 Unrestricted Use Track 1 Soil Cleanup Objectives (SCOs).
7. The following excavation were performed: Excavation and removal of all on-site overburden from grade to bedrock (at 19-23 feet below grade) and removal of bedrock to 26 feet below grade. All on-site soil/fill was removed from the Site. A phased removal action was performed so that all soils exhibiting hazardous waste criteria were excavated with post-removal confirmatory sampling, followed by the removal of all urban fill soils, then residual petroleum contaminated or metals impacted native soils (PCS) beneath the fill, then “clean:” native soils to bedrock, and then bedrock to the final planned depth.
8. A total of 30,011 tons of soil/fill was excavated and removed from the property.
 - a. 1,468.61 tons of hazardous soil/fill was excavated and transported it to Clean Earth of New Jersey, 115 Jacobus Avenue, Kearney.
 - b. 14,855.61 tons of urban fill was excavated and and transported to Impact Environmental, Former NJ Zinc PHASE III Site, 1120 Mauch Chunk Rd., Palmerton, PA.
 - c. 10,528.98 tons of characteristic non-hazardous and petroleum impacted soil was excavated and transported to Bayshore Soil Management, LLC, 75 Crows Mill Road, Keasbey, NJ.
 - d. 2,258.82 tons of characteristic non-hazardous soil was excavated and transported to Total Recycling Corp, 1820 North Dauphin Rd., Allentown, PA
 - e. 336,88 tons of characteristic non-hazardous soil (meeting NJ Res-contact criteria) was excavated and transported to Impact Environmental, Lyndhurst Facility, 100 Page Avenue, Lyndhurst, NJ.

9. Screened excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID.
10. Conducted materials management of excavated materials including temporarily stockpiling and segregating in accordance with defined material types and to prevent co-mingling of contaminated material and non-contaminated materials.
11. Appropriately segregated excavated media onsite prior to disposal.
12. Transported and disposed all soil/fill material at permitted facilities in accordance with all applicable laws and regulations for handling, transporting, and disposing, and the RAWP.
13. Post-excavation confirmation samples were not collected nor possible from the base of the site-wide excavation as the excavation was extended into competent bedrock and no soils remained on-site. Therefore, Track 1 SCOs were achieved.
14. Post-excavation confirmation and/or documentation samples of the sidewalls of the excavations were not collected nor possible. The Site is ringed by a steel sheet pile barrier wall along the property boundary making access to the side wall soils impossible.
15. Discovery and removal of three previously undetected, unregistered 1,000 gallon USTs. Tank 1 and 2, located in grid area B-1, were clean, empty, in excellent condition, with no evidence of impacted soil or leaks. Tank 3 in grid area C-5 was badly pitted, contained oily sludge, and soils surrounding tank were impacted. Tank 3 subsequently determined to be source of Spill 1306369. (Spill 1306369 was reported in May 2013 and closed in December 2013).
16. Excavation and removal of an estimated 260-300 tons of petroleum impacted soils (included in total shipments to Bayshore) associated with Tank 3 in compliance with applicable local, State and Federal laws and regulations.
17. Discovery and reporting of petroleum spill 1504458 on July 27, 2015, identified when free-phase fuel oil was observed weeping through the seams of the sheet pile wall in the southwest corner of the site excavation. The spill appeared to be associated with historical underground storage tanks beneath the floor of the adjacent building to the west. NYSDEC closed the spill on February 1, 2016.

18. Installed a sheet pile barrier wall along the four property boundaries from grade to bedrock to minimize groundwater infiltration during the excavation, removal, and subsequent construction phases of the project.
19. Installed a groundwater recovery sump to dewater the site during the excavation and construction phases of the project. Operated the groundwater recovery and treatment system until dewatering was no longer required. A total of 1,392,000 gallons of groundwater was removed, processed through a DEP pre-treatment liquid phase carbon treatment plant, and discharged under permit to the City of New York Sewer System.
20. As part of development, installed a vapor barrier system beneath the building slab and behind foundation walls of the new building. The vapor barrier/waterproofing membrane on the pre-concrete installation blindside sub-slab and verticals (east and west walls) consists of Grace Preprufe 160R (0.8 mm) with Bituthene 4000 (1.5 mm) used for post concrete installation verticals (north and south walls) The contractor for the Vapor Barrier System construction was ACA Contracting, Inc.
21. Performed all activities required for the Remedial Action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations.
22. Implemented storm-water pollution prevention measures in compliance with applicable laws and regulations.
23. Imported clean structural fill materials to be used as backfill between the barrier walls and building foundation walls in compliance with the Remedial Action Work Plan and in accordance with applicable laws and regulations.
24. Submitted daily reports during soil removal oversight activities. Daily reports were submitted from November 17, 2017 through March 10, 2015 for each day that hazardous or petroleum impacted soils were excavated and/or removed.
25. Submitted weekly inspection/progress reports from March 10, 2015 through June 30, 2015 during removal of clean soils and/or shot rock.
26. Submitted periodic inspection reports From June 2015 through August 2015 when mud slab installation completed and all earth moving equipment removed from the site.
27. Submitted a Sustainability Report.

28. Submitted this RAR that describes the Remedial Action; certifies that the remedial requirements defined in the RAWP have been achieved; defines the Site boundaries; and lists any changes from the RAWP.

3.0 COMPLIANCE WITH RAWP

3.1 HEALTH & SAFETY PLAN

The remedial construction activities performed under this program were in compliance with the Health and Safety Plan and applicable laws and regulations. The Site Safety Coordinator was Tom Zografos, Pav-Lak, Inc through August 4, 2015 followed by Jorge Fernandez, IBC-Pizzarotti, after August 4, 2015.

3.2 COMMUNITY AIR MONITORING PLAN

The Community Air Monitoring Plan provided for the collection and analysis of air samples during remedial construction activities to ensure proper protections were employed to protect workers and the neighboring community. Monitoring was performed in compliance with the Community Air Monitoring Plan in the approved RAWP. The results of Community Air monitoring are shown in Appendix 3.

Continuous perimeter and work zone monitoring data for particulates and VOCs was conducted and reported daily from November 17 through December 3, 2014 during the excavation and removal of hazardous materials.

Continuous work zone monitoring data for particulates and VOCs was collected and reported daily whenever any intrusive activity, management, loading, or off-site transportation of soils was performed for the duration of the removal actions. If pre-established perimeter action levels were exceeded in the work zone (s) the perimeter stations were reoccupied and the boundary conditions evaluated to determine what, if any, appropriate response action was necessary.

- No exceedences of the CAMP action levels were identified by the Site perimeter monitoring stations.
- No exceedences of the perimeter action levels for particulates were detected in the work zones.

Occasional elevated concentrations of VOCs were detected in the work zone breathing air during the excavation of petroleum impacted soils associated with Tank 2 but did not exceed 25 ppm at >20 feet from the open excavation and did not exceed the action levels

at the site boundaries. No VOCs were noted at greater than 5 ppm above normal background at the perimeter for the duration of the project.

Air monitoring was discontinued when all identified environmental hazards had been removed from the Site.

3.3 SOIL/MATERIALS MANAGEMENT PLAN

The Soil/Materials Management Plan provided detailed plans for managing all soil/materials that were disturbed at the Site, including excavation, handling, storage, transport and disposal. It also included a series of controls to assure effective, nuisance free remedial activity in compliance with applicable laws and regulations. Remedial construction activities performed under this program were in compliance general compliance with the SMMP in the approved RAWP with one exception.

During a temporary (2-week) shut-down of site operations in February 2015 the excavation contractor lost track of the exact source of two small piles of staged soils on the Site. Since the exact source of these stockpiles could not be confirmed, and although the removal and confirmation of the removal of all previously known hazardous soils had been documented and reported, as an added safeguard, this soil was also removed off-site for disposal as hazardous materials and reported as such to NYSDEC and OER with explanation.

3.4 STORM-WATER POLLUTION PREVENTION

Storm water pollution prevention included physical methods and processes to control and/or divert surface water flows and to limit the potential for erosion and migration of Site soils, via wind or water. Remedial construction activities performed under this program were in full compliance with methods and processes defined in the RAWP for storm water prevention and applicable laws and regulations.

Precipitation impacting the Site was collected, treated, and discharge to the City Sewer system under the site dewatering permit

3.5 DEVIATIONS FROM THE REMEDIAL ACTION WORK PLAN

Significant deviations from the approved RAWP included a modification to the CAMP

as discussed in Section 3.2, spill response activities associated with encroachment by an off-site oil spill (discussed in section 4.0), and elimination of end-point sampling.

The modification to the CAMP was fully protective of the public health and site worker safety as on-site soils contained no significant concentrations of VOCs, the work was performed from November to March when weather conditions were very effect at controlling dust emissions, and no exceedences of work zone monitoring action levels were detected.

Effective measures were taken to prevent potential impacts to the site and to protect workers and future occupants from the encroachment of apparent fuel-oil from the neighboring site onto the property. The seams of the sheet pile were pressure grouted with a bentonite slurry and/or welded shut wall where free product was observed weeping through. Three iterations of sealing the seams was required before no more material was observed entering the site.

Once the vapor barrier and foundation wall were installed along the west wall of the site, the remaining spaces between the sheet pile wall and the foundation was grouted, effectively sealing the west wall from potential future fuel-oil encroachment.

It was our understanding that at the time that NYSDEC closed Spill 1504458 in February 2015 that they would NOT pursue the investigation and/or remediation of the spill beneath 533 West 27th Street with the current neighboring property owner.

Based on discussions with the case Manager, Mr. Ryan Piper, at Region 2:

1. The neighboring site is not currently an operational registered petroleum bulk storage site and no proper registration for that site exist in the historical database;
2. Consequently, the spill would likely be very old with no known continuing source of release;
3. Whatever damage the spill has done is already done and is not likely to get worse (unless disturbed);

4. The material does not appear to represent an imminent threat to human health or the environment;
5. The spill and the potential historical USTs are located beneath the floor of an existing building with no clear evidence of their exact location(s). Consequently, a removal action is not practical until the entire building is removed; and,
6. The neighboring site currently has an e-designation from NYC-OER for UST protocols. Consequently, the future redevelopment/renovation of the property would be conducted under OER technical oversight. Since this is likely to require an investigation and remediation by OER, NYSDEC is comfortable with allowing the OER process to deal with the spill issue at that time.

There has been no subsequent follow-up with NYSDEC concerning that site. The status of the adjacent Site spill is unknown and does not appear In the Active Spills database.

The final implemented remedy included the complete excavation of all on-site soils down to the top of competent bedrock with the removal of 3-5 feet of competent bedrock to achieve final grade elevations. This was an option included in the RAWP so not technically a deviation. However, as no soils remained within the property boundaries for post-excavation confirmation sampling as proposed in the RAWP.

During a temporary (2-week) shut-down of site operations in February 2015 the excavation contractor lost track of the exact source of two small piles of staged soils on the Site. Since the exact source of these stockpiles could not be confirmed, and although the removal and confirmation of the removal of all previously known hazardous soils had been documented and reported, as an added safeguard, this soil was also removed off-site for disposal as hazardous materials and reported as such to NYSDEC and OER.

4.0 REMEDIAL PROGRAM

4.1 PROJECT ORGANIZATION

Principal personnel who participated in the remedial action included:

- Larry Greenberg, Centaur Properties, LLC: Owner Rep;
- Dan Stone, P.E., The Chazen Companies: Principal-in-Charge;
- Kevin McGrath, PG, CPG, QEP, The Chazen Companies: Project Manager, Senior Technical Lead, QA/QC;
- Scott Schmidt; Chazen; Field Team Leader, Environmental Monitor, Site Environmental Safety Officer (HAZWOP SSO);
- Sean Martin et.al.; Chazen, on-site Environmental Technician;
- Excavation: Veritas Services, Inc;
- Transportation and Disposal: (PT Consulting); and,
- Laboratory Analytical services. York Laboratories, Stratford, CT.

The Professional Engineer (PE) was Dan Stone and Qualified Environmental Professional (QEP) for this project was Kevin P. McGrath.

4.2 SITE CONTROLS

Site Preparation

Preparation of the site for commencement of the remedial activities included:

1. Securing appropriate permits from NYC DOB, DOT, and DEP including:
 - a. Building demolition;
 - b. Sidewalk opening, occupancy, closing, and closures;
 - c. Temporary lane closure;
 - d. Construction fencing construction;
 - e. Sheet pile installations; and

- f. Groundwater recovery, treatment and discharge.
2. Demolition of existing on-site structure to grade (completed prior to final approval of the RAWP);
3. Installation of the sheet-pile barrier wall along the southern, western, and northern property boundaries. The barrier wall was advanced from grade and keyed grouted) into competent bedrock at approximately 27 feet below grade. The eastern edge of the northern and southern sheet pile walls were secured to an existing sheet-pile boundary wall present along the margins of the adjacent 514-520 West 28th Street NYS BCP Site C231082 where remedial action/excavation was already being performed and which was completed before final approval of the RAWP;
4. Installation of temporary power services by Con-Ed for site operations at the northern and southern ends of the western property boundary (September 2014) ;
5. Placement of construction fencing and vehicle barriers along northern and southern property boundaries (September 2014);

The activities above were completed prior to the on-site kick-off meeting and viewed by OER personnel on the day of the pre-kickoff site meeting.

Subsequent pre-remediation activities included:

1. Placement and hook-up of field trailer, portable sanitary services;
2. Mobilization, placement, and connection of groundwater recovery and treatment systems (October 2014);
3. Placement of an OER Project Notice erected at the project entrance. The notice was not in place during all phases of the Remedial Action. The initial signage posted by Pav-Lak, Inc. was removed from the Site in August 2015 when they demobilized from the project and was not replaced by IBC-Pizzarotti until August 2016. However, by that time all hazardous materials had been removed from the site and the building foundations and sub-grade levels were well under construction.

Soil Screening

Removal of on-site soil was conducted sequentially with periodic screening and sampling to determine stop points for each phase of the removal action.

- Delineated soils that had exhibited hazardous or potentially hazardous conditions during preliminary analytical testing were removed first. During the removal, soils were additionally inspected for visual and/or olfactory evidence of impacts and screened with a PID for volatile organic compound emissions. A hand held X-ray fluorescence (XRF) meter was also used to screen the lead content of the soils along the base and sidewalls of the excavations.
- The excavation and removal of hazardous/potentially hazardous soils continued until the results of the XRF were well less than the pre-determined action level of 800 ppm established in the RI and RAWP for potentially hazardous concentrations. Initial screening with the XRF had indicated lead concentrations across the site ranged from 130 ppm to 58,000 ppm. The areas delineated for removal as hazardous/ potentially hazardous soils (based on TCLP analysis for lead) included much of the western half of the site extending to depths between three and six feet below grade. The concentrations of lead were not evenly distributed laterally or vertically. The XRF was used to guide the removal process such that the final screening had soil residual detections greater than 150 ppm for lead.
- Once the hazardous soils had been removed, soils exhibiting characteristic of urban fill and/or petroleum impacts were removed. During the removal, the soils visually inspected for evidence of fill and screened for visual and olfactory evidence of impacts and with a PID for VOC emissions. All soils exhibiting petroleum impacts and/or evidence of urban fill were removed.

Stockpile Management

Temporary staging of soils during the excavation and removal process was avoided to the extent practical by direct loading. When necessary, soils were staged temporarily on the surface adjacent to or within the footprint of the excavation area and loaded-out then same day.

During the removal of known or suspected hazardous soils, excavation was restricted to the availability of trucks for each day of activity so that all material excavated in one day could be loaded and removed that same day. Staged piles greater than about 5 yards of material were temporarily covered if the piles was not being actively managed while waiting for trucks. On a few occasions it was necessary to leave piles overnight (or over a weekend) due to difficulty with truck schedules/arrivals/departures/traffic issues or equipment malfunction (thrown control rod on excavator for example). Piles left for extend periods were double covered and weighted down as needed.

During the removal of non-hazardous urban fill and petroleum impacted materials, soils were excavated by grid area down to the base of the fill. Excess soils that could not be load out directly were staged on the surface in grid areas that had not yet been cleared of urban fill as close to the loading point as practical.

Once all urban fill had been cleared from the site, excavated clean soils were staged in the southeast quadrant adjacent to the loading ramp. Staged stockpiles of clean soils were not covered while waiting for load-out.

Truck Inspection

Vehicles entering or exiting the site were restricted to the 27th Street access way, stone/gravel ramp, or post demolition placed brick-bat cover to avoid, to the extent practical, direct contact with on-site soils. Generally, only the excavator(s) was allowed to move about freely on the interior of the site. Vehicles entering or exiting the site were visually inspecting and cleaned as necessary of loose soils.

The excavators were cleaned, and the treads pressure washed prior to demobilization from the site. Wash waters was added to the excavation water removal system and processed through the treatment plant prior to discharge. No evidence was observed to indicate that any site related hazardous soils or urban fill was released by vehicles that exited the site.

Site Security

The Site was fully enclosed inside a seven foot high construction fence along the northern and southern boundary connected to a building wall to the west and active secure construction site to the east. Three access ways to the Site; one vehicular access on 27th Street and two man ways, one on 27th Street and one on 28th were secured at all times when not in use.

On most days when the site operations were not being conducted, the site was locked down but remained under periodic observation from the sixth floor field office the overlooks the property. Several overview photos of the site from this vantage point are included in the log in Appendix C.

Nuisance Controls

No significant nuisance complaints (odor, dust, noise, traffic, etc.) were received by the Owners or on-site construction management during the performance of the project. No significant nuisances were noted during the remedial action and no controls were employed.

Reporting

During the removal of hazardous soils and urban fill, daily field reports were generated and submitted to OER. These included a descriptions of the work performed each day, sketches of the work areas, manifests for materials shipped off-site, CAMP data for the day, and representative photos of the work. Once all impacted soils were removed, native soil removal and shot-rock removal was reported periodically until final excavation grade elevations were achieved.

Vapor barrier installation was performed by a qualified installation contractor. The barrier installations were subject to Special Inspections protocols by the contractors and by weekly observations by Chazen, and subsequent reporting to OER. Final certification of the Vapor Barrier Installation was provided by the installation contractor. A copy of their certification is attached in Appendix J.

All daily and monthly reports are included in Appendix C.

A digital photographic temporal log of the Remedial Action is included in Appendix D.

4.3 MATERIALS EXCAVATION AND REMOVAL

The Track 1 targeted clean-up goals for the site were achieved by the total removal of all existing earth materials and/or man-made materials from the site from grade to not less than four feet into competent bedrock. This included the removal of all soils, buried utilities, bedrock and groundwater located inside the sheet pile barrier walls to a depth of 26 feet below grade. The following sections detail the removal actions completed.

Earth Materials

Soil

All on-site soils within the boundary limits of the property were excavated and removed for off-site disposal from grade to the top of bedrock (at 18-22 feet below grade). Soils were removed sequentially, initiated by excavation and removal of hazardous soils, followed by excavation of impacted non-hazardous soil and non-native fill, and lastly by removal of non-impacted native soil, sequenced based on pre-delineated areas of impact with screening to confirm complete removal of each impacted zone before advancing into the next category of material.

Hazardous Class Soils

As previously discussed and reported, soil samples collected during the RI and supplemental waste characterization profile samples identified three distinct levels of impact materials. Soils near the surface along the western half of the site contained variable quantities of lead at concentrations ranging from 600 to 58,000 ppm based on XRF analysis in the field. Laboratory analysis by TCLP of soil samples collected from locations where lead concentrations exceeded 800 ppm on the XRF exhibited lead concentrations in the leachate/extract greater than the hazardous waste criteria.

Excavation commenced with the areas known to have the highest lead concentrations and were extended laterally until the side wall screening conservatively exhibited lead concentrations of less than 500 ppm. The base of the excavation was also screened and the excavations extended to depth until the base samples also achieved screening level concentrations of less than 500 ppm.

Soils excavated using this field screening approach, were presumed to be hazardous and directly loaded into waiting dump trucks, to the extent practical, for immediate off-site transport. Temporarily staged materials accumulated while waiting for trucks to return were stockpiled within the excavation. Excavation work was not conducted on days when trucks would not be available to load newly excavated material.

Waiting dump trucks were staged adjacent to the excavation area on the clean brickbat surface laid prior to commencement of remediation to prevent direct contact with the soils or airborne particle migration and to avoid entering the work zone(s) and collecting materials on their tires treads. After loading the transports were brushed free of any loose dirt that spilled over the loading bucket or on the tires, the truck bed covered with a tarp, materials manifested and logged, and then transported to the appropriate disposal facility.

Once all hazardous or potentially hazardous soils had been removed, a final screening was completed to confirm that lead concentrations detected with the XRF were less than the pre-determined removal action level of 600 ppm (in fact, all results were less than 500 ppm). A site map of the approximate end-point screening locations, limits of excavation, and table of XRF results is included.

One round of post-excavation confirmatory sampling was performed to demonstrate the removal of these hazardous soils. Hazardous soil removal commenced on November 17, 2014 and concluded on December 3, 2014 (final load-out was on Monday December 8). Final screening with the XRF and the post excavation confirmatory sampling was conducted on December 4 and December 5, 2014.

Urban Fill and Petroleum Impacted Class Soils

The results of the RI and waste characterization profile sampling for the site had indicated that the site was covered with approximately 8 feet of urban fill consisting of building demolition debris in three quadrants of the Site, thickening and to as much as

approximately 11 feet below grade in the northeast quadrant where the building sub-grade partial basement/utility room was formerly located.

Petroleum impacts were identified in the soils about discovered Tank 3 within the urban fill extending down to the water table at approximately 11 feet below grade where the urban fill was deeper. It appeared from field observations that the spill went downward at the spill location to the water table and spread south-south west.

The urban fill was removed sequentially from current grade (either ground surface or base of the hazardous soils excavation areas) to final depth. Excavation was initiated at the approximate center of each of three areas identified as having the highest concentrations of potentially hazardous lead. Excavation continued outward in all directions until the base and sidewalls of the excavation were below the action threshold on the XRF.

During the removal, soils were visually inspected for evidence of fill material and/or apparent petroleum impacts and screened with the PID. Excavation continued until the entire northern half of the site had been cleared of fill and petroleum impacts.

During the removal of the fill along the northern portion of the Site, three previously undiscovered underground storage tanks and one underground water tank were discovered. Details concerning the removal of these units is discussed in the next section of this report.

Once the northern half of the site had been cleared, the initial access ramp into the site was excavated out from north to south until all the urban fill had been removed at this end of the site. A gravel covered ramp consisting of clean imported crushed-gravel was then installed on the cleared surface to provide access for the duration of the project, allowing similar excavation and soil removal actions to proceed sequentially into the south side of the site.

Urban fill soils and petroleum impacted soils were transported to the same disposal facility and therefore not manifested separately. Consequently, the exact quantity of each type of

material cannot be accurately determined.

Native Class Soils

Once all urban fill and petroleum impacted soils had been removed such that no visual or olfactory evidence of impacts remained and no elevated PID measurements above background conditions (5 ppm) were detected the excavation of non-impacted native soils was performed. The surface elevation of the site, not including the access the ramp, was lowered to a near level grade at approximately 12 feet below the original ground surface using the same procedures previously discussed. The site was then sequentially lowered from 16 feet to the top of bedrock which varied from 19 feet to 22 feet below grade working across the grid From A1- to E-1, then A-2 to E-2, A-3 to E-3 etc until bedrock was exposed across the northern half of the site.

Clearing the southern half of the site to the top of bedrock required relocating the vehicular access ramp to the west, clearing the southeast third of the site, moving the ramp back to its original position, then clearing the western third. The remainder (the central third) was cleared as the ramp was cut back and removed until all on-site soils had been removed.

Bedrock and Imported Stone

The bedrock was cut and removed from the top of rock at 19-22 feet below grade to the final planned elevation of 26 feet below grade. The rock was cut using a combination of pneumatic drilling and hammering to break up the rock into small manageable pieces for off-site transport. Clean imported stone (exact quantity unknown) supplied by All Suffolk Materials, Inc. (ASM) and site generated shot-rock was used to stabilize the toe and the surface of the site access ramp. The stone was removed and added to the shot-rock transported back to ASM for recycling.

Groundwater

A total of 1,348,990 gallons of groundwater was removed from the site from November 2014 through September 2016. Groundwater was removed and processed through a DEP

approved treatment plant and gravity discharged under permit to the City of New York Sewer System.

The original dewatering plans for the site had anticipated an average daily removal of 21,600 gallons per day for an expected total of 2,160,000 gallons of treated discharge during the expected 100 day soil removal phase. However, the actual quantity removed averaged only 2,069 gallons per day because of simultaneous dewatering occurring on the adjacent BCP construction site at 514 West 28th Street. This reduced the available water requiring withdrawal on the Site, with two notable exceptions discussed below.

- In April 2015, the sheet pile barrier wall between the two sites was removed after completion of the constructed foundation wall for the adjacent project building. The removal allowed groundwater from the adjacent property to cascade onto the WC28Realty Site from the unsealed joint along the 28th street side of the property where the barrier walls met. Approximately 12,000 gallons per day were removed with trash pumps from a holding trench cut parallel to the eastern boundary for approximately 15 days while the wall breach was sealed. The joint was pressure grouted and welded shut as needed and the leak eventually stopped.
- In July 2015, during the excavation of native soils along the southwest corner of the site, what appeared to be fuel oil was observed leaking through the joints of the barrier along the west wall near the southwest corner of the site. The oil appeared to be weeping through the barrier wall joints at approximately the water table elevation from beneath the floor of the adjacent building, NYSDEC was contacted immediately and Spill number 1504458 was assigned. After review of historical site information for the adjacent property and discussion with NYSDEC, the oil was determined to be most likely associated with historical tanks on the adjacent Site and not related to the WC-W28THRealty Site. Consequently, Spill 1504458 was closed by NYSDEC on February 1, 2016.

To address the encroachment of oil from the neighboring property spill an oil water

separator was mobilized to the site and added to the groundwater/excavation water recovery system process train. A sump was installed in the floor of the excavation in the SW corner of the site and a shallow soil berm constructed parallel to the boundary wall to redirect oil water to the sump for collection and treatment. Water from the sump was pumped through the oil water separator before being placed in storage of treatment and discharge to the City sewer. A sample of the treated water was collected and submitted to DEP IPPC to demonstrate compliance with the discharge permit.

Several steps were made to seal the joints of property boundary barrier wall to prevent migration of oil from beneath the adjacent property on the site. The seams were pressure grouted and/or spot welding in advance of each foundation wall concrete pour as the wall construction advanced from north to south.

Storage Tanks

Four previously unreported historical underground tanks were discovered during the removal of the urban fill in the north central portion of the Site. One of these was part of some previous water or fire suppression system and appeared to be a large in line pressure relief/expansion tank. The other three were consistent with typical petroleum products storage tanks and presumed to have been former heating fuel tanks.

On November 1, 2014 two underground storage tank (Tank 1 and Tank 2) were discovered at Grid location B-1. These tanks were unearthed at approximately 3 feet below the grade of the former building floor and determined to be 1,000 gallon USTs typically used for petroleum storage. It is assumed that they had been used for storage of fuel oil. The tanks were removed and staged on plastic pending closure. Upon inspection by the UST closure contractor, the interior of the USTs were determined to be empty, clean, and dry and in excellent condition with no evidence of pitting, leaks, or corrosion.. The distribution, fill, and vent pipes had previously been cut and capped.

No significant petroleum impacts associated with this tank were observed and screening of the tank location reported no elevated PID measurements and lead concentrations > 2,500 ppm. The soils in the area were subsequently removed as hazardous materials due to the lead.

On November 12, 2014 a third UST (Tank 3) was discovered in approximately the center of grid C-5. The top of the tank was approximately 3 feet below grade. Based on the location, this tank was adjacent to and immediately outside the basement wall of the former building. The tank appeared to be a 1,000-gallon UST like those typically used to store fuel oil or gasoline. The associated connective piping (fill, vent, and distribution lines) for the tanks were also discovered in place but appeared to have been previously disconnected but not capped.

Upon inspection by the UST closure contractor the tank as determined to be in very poor condition with significant corrosion, pock-marks, and holes. When opened, the UST contained approximately one 55-gallon drum of oily-water and one-drum of tank-bottom sludge (oily dirt). It was subsequently determined that this tank was the most probable source of Spill **1306369**.

The soils around this tank contained lead (at < 2,500 ppm with the XRF) and/or were classified as non-hazardous and petroleum impacted urban fill. Consequently, the soils were excavated and removed for off-site disposal as urban fill petroleum impacted materials.

The three USTs were removed from the subsurface, opened, cleaned, rendered inert and removed off-site for recycling/disposal by Atlas Disposal, Dover NJ. Approximately 50 gallons of impacted wash water, and 36 tons of grossly impacted soils were removed for off-site disposal. A site map depicting the locations of these tanks and the approximate limits of the petroleum impacted soil removed from around the tanks is included as Figure 5. The Manifests for the UST removals are included in Appendix K.

A fourth tank was discovered on November 4 in close proximity to the former

basement foundation wall in grid location D-5. However, this tank appeared to be some type of pressure tank or pressure relief tank connected in-line to a 3-inch diameter former sewer drain line and not a storage tank. It was removed from the site and disposed of as scrap metal.

Maps showing approximate limits of excavation for Hazardous soils, Urban fill, and PCS disposal site selection are included as Figures 5,A, 5B, and 5C.

NYSDEC Petroleum Spills

Two NYSDEC petroleum spill numbers have been assigned to the WC-W28Realty Site; 1306369 and 1504458. Details concerning each spill are included below.

Spill 1306369

In September 2013 during the Phase II/RI soil boring investigation for the Site, evidence of a potential petroleum spill was observed in borings SB-4 (site grid C-7) and SB-8 (site grid C-9). The soils at the water table at these locations at approximately 10.5 feet below grade and extending downward to approximately 14 feet below grade exhibited grey-stained, a petroleum-like odor, and elevated PID measurements greater than 100 ppm. Consequently, a Spill was reported to NYSDEC and Spill number 1306369 assigned to the Site.

The results of laboratory analysis of impacted soil samples from SB-4 and SB-8 reported the presence of VOCs and SVOCs in the soils at concentrations less than NYSDEC's CP-51 petroleum clean-up standards. Trace concentrations of VOCs and SVOCs were also reported in a groundwater sample collected from monitoring well MW-5 installed in boring SB-8. Based on these results, NYSDEC closed Spill 1306369 on December 10, 2013. A copy of spill fact-sheet from the NYSDEC on-line spill database is attached in Appendix K.

During the demolition of the building in March 2014, petroleum staining of the soils were observed of the basement when the building subgrade floor was removed. The staining was in the southwest corner (site Grid C-4) where a vaulted fuel-oil AST had previously

been located. The NYSDEC case manager was notified of the discovery of the impacted soils.

On December 8, 2014, a previously undiscovered underground storage tank (Tank 3) was located in grid area C-5. The UST was observed to be in very poor condition with obvious evidence of leaks. It was removed immediately along with approximately 36 tons of grossly impacted soils and reported immediately to the NYSDEC case manager.

At the time of its removal, it was obvious that Tank 3 was the source of spill 1306369. Subsequent excavation include removal of petroleum impacted soils from all or part of grids B4, B5, B6, B7, B8, C4, C5, C6, C7, C8, D4, D5, D6, and D-7 covering an area of approximate 2,800 square feet. Based on field observations, it appeared that the oil leaking from Tank 3 migrated vertically to the fill/native soil interface and spread along the interface while continuing downward to the water table. Except in grid location C-5, which was impacted from approximately 6 feet to 14 ft below grade, the impacts were confined to a narrow band of soils from approximately 9 feet to 12 feet below grade between the fill/soil interface and the water table.

Per our discussion with NYSDEC, since the discovery occurred during the performance of an NYC-OER approved remedial action plan for the site that would ultimately include the excavation and disposal of all on-site soils, no new spill was assigned and existing closed spill 1306369 was not reopened and no confirmatory samples would be required provided that the excavation was completed as planned. NYSDEC requested that a copy of the approved RAR be submitted for their file when available.

Spill 1504458

Spill 1504458 was reported to NYSDEC on July 27, 2015 when what appeared to be free-phase product was observed weeping through seams in sheet pile barrier wall along the western side of the site. Upon inspection, oil and oily water was observed weeping through several of the sheet pile wall seams in grid areas A-9 and A-10 and

pooling at the base of the excavation. At the time that leak was first observed, the base of the excavation in these grid areas was at approximately 20 feet below grade with no apparent petroleum impacts observed in the soils along this wall before the leaking started.

A shallow trench was excavated to bedrock along the base of the wall with a small earthen berm and absorbent booms was used to contain the oil in a narrow strip along the edge of the site. A sump, pump, and oil water separator were mobilized to the Site and used to collect the oily water and prevent it from expanding and impacting a larger area of the site. Discharge from the O/W separator was processed through the groundwater recovery system treatment plant and discharge to the sewer.

Several iterations of resealing the wall seams which included surface grouting, pressure grouting, and spot welding, were needed to finally stop the observed weeping of oil through the seams. With the completed foundation walls and grouting of the interstitial spaces between the foundation and sheet pile walls seepage from the adjacent property I no longer an issue for the Site.

A review of historical information for the adjacent Site and the lack of any supporting evidence of a connection between Tank 3 and 1504458 indicated that the observed petroleum seeping through the barrier wall was most probably associated with historical underground storage tanks on the adjacent property. A project memo was submitted to NYSDEC and Spill 1504458 was closed.

Confirmation of spill closure is included in Appendix L.

Soil Cleanup Objectives and End Point Samples

The SCOs for this Remedial Action are NYSDEC Part 375 Track 1 Unrestricted Use SCOs. The SCOs for the Site were achieved by the complete removal of all on Site soils within the property boundaries from grade to competent bedrock.

Excavation was performed of all earth materials contained within the property boundary barrier walls from grade to not less than 4 feet into competent bedrock. Consequently, no final post-excavation confirmation samples were collected, necessary, not possible.

Three five-point composite interim end-point samples were collected on December 4 and 5, 2014 from the base of the hazardous soil excavation zone (approximately 1 sample per 2,500 ft²) to demonstrate complete removal of hazardous soils prior to transitioning to excavation and removal of urban fill. The samples were submitted to an ELAP certified environmental laboratory for analysis of lead content by TCLP. The highest concentration of lead reported was 0.0475 mg/l which is two orders of magnitude less than the hazardous characteristic threshold criteria of 5 mg/l.

4.4 MATERIALS DISPOSAL

Using the data generated in the RI site investigation and a waste characterization profile investigation report completed by PT Consulting on October 7, 2014, the on-site soils were divided laterally and vertically based on five specific soil classes and the estimated quantities of each soil class determined. Permitted disposal facilities were contacted and their acceptance of the materials secured.

The five classes of soils that were identified include:

1. Soils that exhibited exceedences of hazardous waste criteria based on the concentrations of lead and/or mercury in the TCLP sample analysis.
2. Urban soils meeting Pennsylvania Regulated Fill Criteria;
3. Urban fill or impacted native soils meeting New Jersey Residential Contact Fill Criteria;
4. Urban fill or impacted native soils (including petroleum impacts) that meet the New Jersey non-contact residential fill criteria; and
5. Native soils meeting the New Jersey Residential Contact Fill Criteria suitable for recycling.

Shot-rock and imported clean gravel received from a permitted material supplier was not classified nor is classification required for management and recycling of these materials.

Initial soil classification was performed through laboratory analysis of representative soil samples and comparison of the results to the applicable standards, criteria, and guidance. Supplemental classification and quantity estimates were determined by laboratory analysis of samples collected by PT Consultants, Inc.

During removal soils were screened with the XRF and/or the PID and inspected for visual or olfactory evidence of impacts prior to and during the loading process to ensure that soils were properly classified for disposal.

The material type, quantity, disposal location, and timeframe for removal of material disposed off-Site is presented in the table below.

Table 4.4: Disposal Facilities, Materials, and Quantities

Disposal Location/Address	Type of Material	Quantity (tons)	Dates
<i>Clean Earth of North Jersey</i> (CENJ) 115 Jacobus Avenue Kearney, NJ 07032	Characteristic Hazardous Soil	1,468.61	11/18/2014 Through 12/08/14
IMPACT Environmental Phase III Environmental Former NJ Zinc Site 1120 Mauch Chunk Rd Palmerton, PA	Characteristic non-Hazardous Soil (Urban Fill)	14,855.61	3/10/2015 Through 6/30/2015
IMPACT Environmental Lyndhurst Facility 1000 Page Avenue Lyndhurst, NJ 07071	Characteristic Non-hazardous soils (Meets NJ Res Contact)	336.88	2/25/15
Bayshore Soil Management, LLC 75 Crows Mill Road, Keasbey, NJ 08832	Characteristic non-Hazardous Soil & Petroleum Contaminated Soil	10,528.98 (total includes the 260-300 tons of PCS)	1/8/2015 Through 3/10/2015
<i>Total Recycling Corporation</i> (PADEP Facility ID# 16848) 1820 N Dauphin St Allentown, PA 18109.	Characteristic non-Hazardous Soil	2,225.82	1/8/2015 Through 2/10/2015
All Suffolk Materials 70 Comsewogue Rd # 5	Shot-rock and clean imported clean stone	5,100	3/1/2015 Through

Setauket-East Setauket, NY 11733.			8/15/2015
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One round of interim post-excavation confirmatory sampling was performed to demonstrate the removal of all Class 1 Soils. No additional analytical samples were collected or required for Class 2-5 soils based on the acceptance criteria of the disposal facilities and pre-determination samples previously connected.

- Copies of letters of acceptance from each receiving facility for each class of soils are attached in Appendix E.
- A summary table of the shipments to each facility and copies of the disposal manifests are included in Appendix F.
- Summary Tables for the laboratory data and the laboratory analytical reports are included in Appendix G.
- Soil classification sketches based on the RI and waste characterization sampling are included in the report from PT Consultants in Appendix G.

4.5 BACKFILL IMPORT

No excavation back-fill was used on site.

Some imported structural sand secured from East Coast Mines and Materials, a NYS permitted mining facility on Long Island and meeting the specifications in the approved NYC DOB building plans was used. Approximately 50 cubic yards of placed fill was used for the secant wall placement along the western property boundary. Certification by the Site Engineer is included in Appendix L.

5.0 ENGINEERING CONTROLS

A Track 1 Unrestricted Use Remedial Action was achieved and Engineering Controls are not required. However, as part of construction, a Vapor Barrier System (VBS) and was installed.

Vapor Barrier System

As part of development, a Vapor Barrier System installed at the Site. The VBS was placed between the mud-slab and building floor and between the poured concrete foundation walls and steel property boundary barrier wall.

The VBS is a seamless waterproofing/vapor barrier consisting of a combination of Preprufe 300R (1.2-mil) and 160R (0.8-mil) and Bituthene 4000 (1.5 mil). Both products are manufactured by WR GRACE.

- Preprufe® Plus waterproof membranes are composite sheets comprising a robust HPDE backing, a pressure sensitive adhesive and a trafficable weather resistant coating with dual adhesive Preprufe® ZipLap™ for added security.
- Bituthene® System 4000 Waterproofing Membrane is a 1.5 mm (1/16 in.) flexible, pre-formed membrane which combines a high performance, cross laminated, HDPE carrier film with a unique, super tacky, self-adhesive rubberized asphalt compound.
- Bituthene® System 4000 Surface Conditioner is a water-based, latex surface treatment which imparts an aggressive, high tack finish to the treated substrate. It is specifically formulated to bind site dust and concrete efflorescence, thereby providing a suitable surface for the Bituthene® System 4000 Waterproofing Membrane.

The manufacturers product specification data sheets are included in Appendix J.

The VBS was installed around the entire sub-grade envelope of the building by ACA Contracting, Inc, under the direct daily supervision of ACA's Construction Manager supplemented by weekly observations and progress reports provided by and to Chazen. A copy of the installation certification by the installation contractor and warranty for the installations are included in Appendix J.

Construction design drawings prepared by the project Architect (SBLM for the foundations and installation drawings prepared by site professional engineer (Grant) are included in Appendix J. Photographs of installation of the Vapor Barrier System are included in the

photo log in Appendix D.

The Preprufe 300R was used beneath the main building sub-grade foundation slab. It was placed atop the mud-slab and beneath the floor forms prior to pouring the concrete. Necessary penetrations of the barrier layer were booted and sealed with liquid preprufe sealant in accordance with the attached plan specifications and drawings.

Preprufe 160R was used on the west and northern barrier walls. The barriers were emplaced in accordance with the building design plans along the inner edge of the sheet pile barrier wall, then the wall forms placed the concrete poured for the foundation walls. The barriers extend vertically from the base of the walls where it dovetails into the sub-slab barrier, to the top of the wall where it is pinned beneath the first floor (grade elevation) slab the rests atop the wall at approximately 12-inches below surface grade.

The Bituthene 4000 system was used along the eastern and southern walls. The eastern and southern foundation walls were poured and cured. Once cured they were coated with the surface conditioner then overlapping sheets placed vertically from the base to the top of the wall, sealed into the sub-slab layer, and pinned beneath the first floor slab.

6.0 INSTITUTIONAL CONTROLS

A Track 1 Unrestricted Use Remedial Action was achieved and Engineering Controls and Institutional Controls are not required.

7.0 SITE MANAGEMENT PLAN

A Track 1 Unrestricted Use Remedial Action was achieved and Site Management is not required.

8.0 SUSTAINABILITY REPORT

This Remedial Action Work Plan provides for sustainable remediation and redevelopment (if applicable) through a variety of means that are defined in this Sustainability Report.

Reuse of Clean, Recyclable Materials.

Reuse of clean, recyclable materials reduces consumption of non-renewable virgin resources and can provide energy savings and greenhouse gas reduction since these materials can be locally-derived.

No imported earth materials were used in this project as permanent fill/backfill except for the structural sand used in the sub-slab and foundation wall envelope of the new structure. Structural sand meeting the specifications in the approved DOB construction plans and meeting the NYCRR for new construction was utilized.

No recyclable materials were used in this project nor needed.

Conservation of Non-Renewable Resources.

Not applicable. No non-renewable resources were used to complete the remedial action.

Reduced Energy Consumption and Promotion of Greater Energy Efficiency.

Reduced energy consumption lowers greenhouse gas emissions, improves local air quality, lessens in-city power generation requirements, can lower traffic congestion, and provides substantial cost savings.

Energy conservation measures were employed throughout the course of the project. However, the impact of these measures cannot be quantified. The following means were used to reduce energy consumption in this project:

Scheduling use of excavation equipment and transports to minimize the “idling time” of equipment not in immediate use;

Scheduling transport vehicles to maximize daily removal quantities while minimizing stand-by time; and,

Batch operation of groundwater treatment and discharge to move high flown short durational slugs of recovered groundwater from the site to the sewer to minimize idling the system;

Conversion to Clean Fuels.

Use of clean fuel improves NYC's air quality by reducing harmful emissions.

No "clean fuels" were used during remedial activities.

Recontamination Control.

Recontamination after cleanup and redevelopment is complete undermines the value of work performed, may result in a property that is less protective of public health or the environment, and may necessitate additional cleanup work later that could impede future redevelopment. Recontamination can arise from future releases that occur within the property or by influx of existing contamination from off-Site. At this site, the following measures limit the potential for site recontamination:

- The complete removal of all on-site soil and groundwater from inside the property boundaries effectively eliminates the possibility of recontamination occurring from on-site residual impacts.
- There is some potential for off-site migration of impacted groundwater to cause impacts to the site. Groundwater seeping through the intact sheet pile barrier walls surrounding the property could infiltrate into the foundation wall envelop. However, any structural sands between the steel pile walls and concrete foundations have minimal adsorptive capacity for dissolved organics.
- There is some potential for future impacts to the indoor air quality resulting from the vapor intrusion of dissolved VOCs in migrating off-site groundwater entering the site through unsealed joints in the barrier walls. This risk is minimized by the placement of the sub-grade vapor intrusion barrier around the building envelope.
- The highest potential for new impacts to the site is from the existing fuel-oil spill beneath the adjacent property to the west of the Site. Seepage through the barrier wall between the sites was eliminated through pressure grouting the joints of the

barrier wall and welding the joints closed where necessary before pouring the foundation walls.

Storm-water Retention

Storm-water retention improves water quality by lowering the rate of combined storm-water and sewer discharges to NYC's sewage treatment plants during periods of precipitation, and reduces the volume of untreated influent to local surface waters.

Development plans include a single 16,741 gallon storage tank for storm water in general accordance with the NYS stormwater design manual and the NYC DEP Guidelines. Enhanced retention is provided for the entire footprint of the property (19,755 ft²). The location of the tank is included in the sub-celler plan included as Figure 3A.

Linkage with Green Building.

Green buildings provide a multitude of benefits to the city across a broad range of areas, such as reduction of energy consumption, conservation of resources, and reduction in toxic materials use.

Site redevelopment was designed to qualify for the LEED-AP Silver certification.

Paperless Voluntary Cleanup Program

WC-W28 Realty, LLC participated in OER's Paperless Voluntary Cleanup Program. Under this program, submission of electronic documents replaced submission of hard copies for the review of project documents, communications and milestone reports. A best estimate of the mass (pounds) of paper saved under this plan is 300 pounds.

Low-Energy Project Management Program

WC-W28 Realty, LLC participated in OER's low-energy project management program. Under this program, whenever possible, meetings were held using remote communication technologies, such as videoconferencing and teleconferencing to reduce energy consumption and traffic congestion associated with personal transportation. A gross estimate of the number of miles of personal transportation that was conserved in this process is 2,320 miles.

Trees and Plantings

Trees and other plantings provide habitat and add to NYC's environmental quality in a wide variety of ways. Native plant species and native habitat provide optimal support to local fauna, promote local biodiversity, and require less maintenance. The number of trees planted as part of this redevelopment is zero. However, green space is provided in the plans through the inclusion of two "gardens" for use by the residents. A 3,134 ft² at-grade courtyard and a 4,743 ft² second floor garden area are included.