

1326 OCEAN AVENUE

BROOKLYN, NEW YORK

Remedial Action Report

NYC VCP Project Number 15CVCP125K

E-Designation Project Number 15EHAZ434K

DDC Project Number BEG52007006

Prepared For:

Chess Builders LLC

199 Lee Avenue PMB #103, Brooklyn, NY 11211

(718) 522-5422

Prepared By:

Shaik Saad P.E.

15 Ocean Avenue, Suite G, Brooklyn, NY 11225

(718) 636-0800

pmatli@hydrotechenvironmental.com

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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
PBS	Petroleum Bulk Storage
QA/QC	Quality Assurance/Quality Control
QEP	Qualified Environmental Professional
RAR	Remedial Action Report
RAWP	Remedial Action Work Plan
SCG	Standards, Criteria and Guidance
RCA	Recycled Concrete/Stone Aggregate
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, Shaik Saad, 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 1326 Ocean Avenue site, OER site number 15EHAZ434K and NYC Voluntary Cleanup Number 15CVCP125K.
- I have reviewed this document, to which my signature and seal are affixed.
- Engineering Controls implemented during this remedial action were designed by me or a person under my direct supervision and achieve the goals established in the Remedial Action Work Plan for this site.
- The Engineering Controls constructed during this remedial action were professionally observed by me or by a person under my direct supervision and (1) are consistent with the Engineering Control design established in the Remedial Action Work Plan and (2) 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 April 21, 2015 and Stipulations in letters dated April 27, 2015 and February 22, 2016 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 SHAIK SAAD

PE License Number 071078

Signature



Date

8/23/17



I, Mark E. Robbins, certify the following:

- I am a Qualified Environmental Professional. I had primary direct responsibility for implementation of the remedial program for the 1326 Ocean Avenue site, OER site number 15EHAZ434K and NYC Voluntary Cleanup Number 15CVCP125K.
- The OER-approved Remedial Action Work Plan dated April 21, 2015 and Stipulations in letters dated April 27, 2015 and February 22, 2016 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 Mark E. Robbins

QEP Signature



Date

8/23/17

EXECUTIVE SUMMARY

Chess Builders, LLC has enrolled in the New York City Voluntary Cleanup Program (NYC VCP) to investigate and remediate a property located at 1326 Ocean Avenue in the Midwood section of Brooklyn, 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 the 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 and complies with applicable environmental standards, criteria and guidance and applicable laws and regulations.

Site Location and Background

The Site is located at 1326 Ocean Avenue in the Midwood section of Brooklyn, New York and is identified as Block 6703 and Lot 55 on the New York City Tax Map. The Site is 21,237-square feet in area and is bounded by Ocean Avenue to the east, Long Island Rail Road to the south, a 6-story residential building and a 4-story residential building to the west, a 4-story residential building to the northwest and two 4-story residential buildings to the north. The Site was surrounded by a street fence along the eastern, southern and northern boundaries and a concrete wall along the western boundary. Prior to development, the Site was vacant and covered by bare soil.

Summary of Redevelopment Plan

The new development at the Site consists of a new 8-story residential building with a partial basement and rear open parking space. The building is developed in the eastern portion for a total footprint of approximately 12,030 square feet. The partial basement is developed beneath the northern portion and central portions of the building for a total area of approximately 10,072 square feet. The partial basement is designed for

use as a gym, bicycle storage, residential storage, pet spa and mechanical rooms. The building has a slab-on grade outside the perimeter of the partial basement.

The Site was excavated to the depth of 10 feet across the partial basement slab, to the depth of 12 feet for the building footings, to the depth of 2 feet 6 inches for the slab on grade and to 1 foot beneath the asphalt parking area. The excavation for the building foundations layout is a deviation from the development plan noted in the RAWP stipulations.

The entire building is capped with a 6-inch thick slab poured on top of 6-inch of backfill consisting of $\frac{3}{4}$ inch recycled stone aggregates (RCA). The rear parking lot, which covers the remainder of the site, is paved with 2-inch asphalt on top of a 4-inch thick RCA.

The new development at the Site is consistent with the NYC zoning designation R7A Residential District.

Summary of Description of Surrounding Property

The Site is located in a residential and commercial neighborhood. Ocean Avenue and Brooklyn College Heating Plant is located to the east; Long Island Rail Road is located to the south; a 6-story residential building and a 4-story residential building are located to the west; a 4-story residential building is located to the northwest; and two 4-story residential buildings are located to the north.

Within a 500 feet radius of the Site, there are a variety of land uses including: residential (multi-story residential apartments), open spaces & outdoor recreation, public institutions and public transportation. Properties located within a 1/4-mile radius of the Site are zoned R2, R3X, R4, R4A, R5, R6 and R7A (general residential districts).

Within 250 feet radius of the Site, no sensitive receptor is identified. The surrounding land uses include residential buildings and public institutions.

Summary of Past Site Uses and Areas of Concern

Based upon the review of the Fire Insurance Maps and Regulatory Agency documents from previous investigations listed below:

- Phase I Environmental Site Assessment, 2003, EAI, Inc
- Limited Phase II Environmental Site Assessment, February 2004, EAI, Inc
- Tank Closure, March 2004, Don Carlo Environmental Services
- Phase I Environmental Site Assessment, June 22, 2004, Don Carlo Environmental Services
- Subsurface Investigation, August 8, 2006, Hydro Tech Environmental, Corp.
- Groundwater Investigation, January 8, 2007, Hydro Tech Environmental, Corp.
- GPR Letter, March 21, 2007, Hydro Tech Environmental Corp.
- Tank Exploration, April 30, 2007, Hydro Tech Environmental Corp.
- Phase II Site Investigation, September 28, 2007, Louis Berger & Associates, PC.
- Phase I Environmental Site Assessment, January 23, 2015, Middleton Environmental Inc.

Based on the above investigations, a Site history was established. The Site was occupied by a 1-story commercial building with a gasoline service station between 1917 and 2004. An automobile repair shop occupied the 1-story building between 1949 and 2004. The Site has been vacant since 2004.

The AOCs identified for this site included:

- The presence of open NYSDEC Spill #03-13237
- The historic use of the Site as a gas station from 1917 to early 2004;

- The presence of volatile organic compounds (VOCs) in soil, groundwater and soil vapor beneath the Site;
- The presence of historic fill material to depth ranging between 15 and 20 feet.

Summary of the Work Performed under the Remedial Investigation

1. Conducted a Site inspection to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);
2. Performed a Ground Penetrating Radar (GPR) survey throughout the entire Site and excavated trenches to an approximate depth of 7 to 10 feet over a grid pattern in the northwestern and southwestern portion;
3. Excavated, cleaned and removed eight (8) 550-gallon gasoline underground storage tanks (USTs) from Tank Pit 1 in the southeastern portion, two (2) 4,000-gallon gasoline underground storage tanks (USTs) from Tank Pit 2 in the northern portion and one (1) 550-gallon waste oil tank (UST) from Tank Pit 3 in the southwestern portion;
4. Collected end point samples around the closed/removed underground storage tanks (USTs) in accordance to NYSDEC DER-10. Ten (10) grab samples were taken from 16 feet bgs in the Tank Pit 1 and Tank Pit 2 while three (3) samples were submitted from Tank Pit 3, two (2) of which were composite (East/South and North/West) and the remaining one is grab (Middle). A total of thirteen (13) composite and grab soil samples were submitted from three tank areas;
5. Installed a total of twenty-eight (28) soil borings across the entire project Site, and collected a total of fifty three (53) soil samples for chemical analysis from the soil borings to evaluate soil quality; these included eight (8) composite samples from zero to 14 feet bgs, one (1) composite sample from 3 to 15 feet bgs, one (1) composite sample from 5 to 17 feet bgs, nineteen (19) shallow samples from zero to 2 feet bgs, six (6) shallow sample from 2 to 4 feet bgs, three (3) deep samples from 10 to 12 feet, one (1) deep sample from 11 to 13 feet, three (3) deep samples

from 14 to 16 feet, seven (7) deep samples from 15 to 17 feet bgs, one (1) deep samples from 32 to 35 feet bgs and two (2) deep samples from 36 to 37 feet bgs.

6. Installed a total of ten (10) groundwater monitoring wells including seven (7) wells across the Site and three (3) wells in the east-adjacent sidewalk and collected a total of ten (10) groundwater sample for chemical analysis to evaluate groundwater quality;
7. Installed seven (7) soil vapor probes around Site perimeter and collected seven (7) samples from 11 feet bgs for chemical analysis;
8. One (1) outdoor air sample was collected for chemical analysis.

Summary of Findings of Remedial Investigation

1. Elevation of the property is 35 feet.
2. Depth to groundwater at the Site ranges between 33.3 and 37 feet.
3. Groundwater beneath the Site vicinity presumed to be from northwest to southeast.
4. Depth to bedrock is presumed to be in excess of 50 feet at the Site.
5. The GPR survey identified no anomalies indicative of USTs. However, the survey identified segments of buried pipes that are most likely associated with the former USTs and dispenser island at the Site.
6. The stratigraphy of the Site, from surface down to about 15-20-ft bgs, is classified as fill consisting of brown sand with varying amount of brick and pebbles. The fill layer is underlain by a layer of coarse to fine sand till the saturated zone (35-40 ft bgs).
7. Soil/fill samples collected during the remedial investigations were compared to the 6NYCRR Part 375 Track 1 Unrestricted Use Soil Cleanup Objectives (SCOs) as well as to Track 2 Restricted Residential Use SCOs. Soil/fill samples collected during RI showed seven VOCs including 1,2,4-

trimethylbenzene (max. 790 mg/kg or mg/kg), 1,3,5-trimethylbenzene (max. 240 mg/kg), ethyl benzene (max. 57 mg/kg), n-propylbenzene (max. 83 mg/kg), o-xylene (max. 190 mg/kg), sec-butylbenzene (max. 24 mg/kg) and toluene (max. 13 mg/kg) were detected at concentrations exceeding their respective Track 1 SCOs in 1 shallow and 4 deep soil samples. Of these VOCs, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, ethyl benzene and o-xylene also exceeded Track 2 SCOs in the shallow soil sample. Chlorinated VOCs including PCE and TCE did not occur in any soil samples. Acetone (max. 0.12 mg/kg), was detected at concentrations exceeding its respective Track 1 SCOs in two deep soil samples. Eight SVOCs including benzo(a)anthracene (max. of 4.6 mg/kg), benzo(a)pyrene (max. of 3.2 mg/kg), benzo(b)fluoranthene (max. of 3.9 mg/kg), benzo(k)fluoranthene (max. of 2.01 mg/kg), chrysene (max. of 1.27 mg/kg), dibenzo(a,h)anthracene (1.1 mg/kg), Indeno(1,2,3-cd)pyrene (max. of 2 mg/kg) and naphthalene (max. of 41 mg/kg) were detected at concentrations exceeding their respective Track 1 SCOs in five shallow soil samples and one deep soil sample. Of these SVOCs, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(k)fluoranthene, dibenzo(a,h)anthracene, and Indeno(1,2,3-cd)pyrene were also detected at concentrations exceeding their respective Track 2 SCOs in four shallow soil samples and the deep sample. Two pesticides including 4,4'-DDE (max. of 0.031 mg/kg) and 4,4'-DDT (max. of 0.0083 mg/kg) occurred at concentrations exceeding their Track 1 SCOs in two shallow soil samples. Total PCB was detected below its Track 1 SCO in one of the shallow soil samples. Seven metals, including; arsenic (max. of 15 mg/kg), barium (max. of 850 mg/kg), copper (max. of 55.70 mg/kg), lead (max. of 220 mg/kg), nickel (max. of 49.90 mg/kg), mercury (0.60 mg/kg) and zinc (max. of 680 mg/kg) were identified at concentrations exceeding Track 1 Unrestricted SCOs in fourteen shallow and seventeen deep soil samples. Of these metals, barium also exceeded its Track 2 SCOs in one shallow sample. Overall, the VOC findings were consistent with historic use of the Site as a gasoline filling

station and the PAHs and metal findings are consistent with observations for historic fill sites in areas throughout NYC.

8. Groundwater samples collected during the RI were compared to the 6NYCRR Part 703.5 Groundwater Quality Standards (GQS). Groundwater results showed several petroleum related VOCs including 1,2,4-trimethylbenzene (max. 960 µg/l), 1,3,5-trimethylbenzene (max. 160 µg/l), benzene (max. 25 µg/L), ethylbenzene (max. 840 µg/L), isopropylbenzene (max. 140 µg/L), n-butylbenzene (max. 28 µg/L), n-propylbenzene (max. 370 µg/L), o-xylene (max. 770 µg/L), sec-butylbenzene (max. 34 µg/L), tert-butylbenzene (max. 84 µg/L) and toluene (max. 340 µg/L) detected at concentrations exceeding GQS in four samples. The chlorinated solvents PCE and TEC did not occur in any groundwater samples, however, the PCE derivative 1,1,1,2-Tetrachloroethane (max. 1,500 µg/L) was detected at a concentration exceeding its GQS in three samples. The SVOC Naphthalene (max. 79 µg/L) was detected at concentrations exceeding GQS in three groundwater samples. Dissolved metals including magnesium (max. 54,000 µg/L), manganese (max. 3,600 µg/L) and sodium (max. 83,000 µg/L) were detected at concentrations exceeding GQS. No pesticides or PCBs were detected in the groundwater samples.
9. Soil vapor results collected during the RI show a wide range of compounds throughout the property including BTEX and associated petroleum related compounds as well as chlorinated hydrocarbons. BTEX and associated derivatives were found in all vapor samples and include a wide number of compounds. The concentration of these compounds range from 0.38 micrograms per cubic meter (ug/m³) to 21 ug/m³. Chlorinated hydrocarbons were also commonly detected in all soil vapor samples at concentrations that are well below the NYSDOH guidance. Detected chlorinated hydrocarbons included PCE (max. 2.60 ug/m³), TCE (max. 0.51 ug/m³), chloroform (max. 1.10 ug/m³), methylene chloride (max. 22 ug/m³) and acetone

(maximum 1,700 ug/m³). BTEX and chlorinated hydrocarbons including PCE (0.95 ug/m³), TCE (max. 0.51 ug/m³) are detected in the outdoor at trace concentration.

Summary of the Remedial Action

The Remedial Action 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; addressed applicable standards, criteria, and guidance; reduced mobility, toxicity and volume of contaminants; was cost effective and implementable; and used standard methods that are well established in the industry. The remedial action is effective in the short-term and long-term.

A summary of the milestones achieved in the Remedial Action is as follows: Three Phase I investigations were conducted in 2003, 2004 and 2015. A Pre-Application Meeting was held on February 18, 2015. Limited Phase II investigation were conducted in 2004 and 2006, and a Remedial Investigation (RI) was performed from June 2007 to March 2015. 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 April 22, 2015 for a 30-day public comment period. The RAWP and Stipulation Lists dated April 27, 2015 and February 22, 2016 were then approved by the New York City Office of Environmental Remediation (OER). Site briefings was conducted with New York State Department of Environmental Conservation (NYSDEC) in February 2015. NYSDEC Spill Division was briefed in March 2015 and approved remedial action on April 27, 2015. A Pre-Construction meeting was held on September 21, 2015. A Fact Sheet providing notice of the start of the remedial action was not issued. The remedial action was begun on December 7, 2015 and completed on May 12, 2017. Appendix 2 includes the RAWP. Appendix 3 includes the RAWP Stipulation Lists.

The remedial action consisted of the following tasks:

1. Prepared a Community Protection Statement and implemented a Citizen Participation Plan.
2. Mobilized (November 2015) site security and equipment; completed utility mark outs; and marked and staked excavation areas.
3. Performed Waste Characterization Study prior to excavation activities. Five (5) waste characterization soil samples were collected on April 30, 2015, May 1, 2015 and February 15, 2016. Waste characterization samples were collected at a frequency dictated by disposal facility(s).
4. Performed a Community Air Monitoring Program for particulates and volatile organic carbon compounds.
5. Selected NYSDEC Part 375 Established Track 4 Site Specific Soil Cleanup Objectives (SCOs). The Site-Specific SCOs utilized for this project are the following: total VOCs (10 ppm), total SVOCs (250 ppm), barium (750 ppm), lead (1,000 ppm) and mercury (1.5 ppm).
6. The following excavations were performed: soil was removed
 - a. to a depth of 10 from grade beneath the partial basement;
 - b. to a depth of 12 feet from grade for localized basement footings;
 - c. to a depth of 2.5 feet from grade beneath the area of the slab-on grade outside the perimeter of the partial basement; and
 - d. to a depth of 8 feet bgs within the limits of three 7-foot diameter drywells installed in the rear parking area.
7. Screened excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID. No organic vapors (<0.1 ppm) or visual/olfactory evidence of contamination were identified in the excavated soil at the Site.
8. 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. This task was completed in accordance with the Soil Material Management Plan in the RAWP.

9. 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. A total of 9,544.66 tons of soil/fill were excavated and removed from the property. Breakdown is :
 - a. excavated 5,827.27 tons of non-hazardous soil/fill and transported it to Impact Recovery and Reuse Center located at 1000 Page Avenue in Lyndhurst, New Jersey;
 - b. excavated 2,627.52 tons of non-hazardous soil/fill and transported to PPark NJ, LLC (PPark) located at 100 Platen Avenue in Prospect Park, New Jersey ;
 - c. excavated 1,089.87 tons of non-hazardous soil/fill and transported it to Pure Soil of Perth Amboy located at 1160 State Street in Perth Amboy, New Jersey;
 - d. removed 114.94 tons of former and concrete footings were disposed as construction and demolition (C&D) material at Allocco Recycling Ltd, at 540 Kingsland Avenue in Brooklyn New York; and
 - e. Removed 154.40 tons of C&D materials and disposed at Regal Recycling Company, Inc. located at 172-06 Douglas Avenue, Jamaica, New York .
10. Removed two (2) 1080-gallon number 2 fuel oil USTs and one (1) 550-gallon number waste oil UST beneath the western and southern portions of the Site during excavation activities in compliance with applicable laws and regulations. A total of 2,216 gallons of liquid was removed from the USTs by a Vacuum Truck and disposed at a licensed facility by Rapid Waste Disposal, Inc. located at 444 Tiffany Avenue in Bronx, NY. FDNY tank removal affidavit was obtained and all tanks were registered and closed with NYSDEC (PBS # 2-191620).
11. After the removal of above three USTs, one (1) end-point soil sample was collected from the bottom of UST-1 excavation (in the western portion) and five endpoint soil samples from beneath each of the UST-2 and UST-3 excavations (in the western and southern portions). The endpoint samples detected traces of VOCs and/or SVOCs in two of 11 samples, at concentrations that were below Unrestricted Use SCOs.

12. Collected and analyzed four (4) end-point samples at the excavation floor and evaluated data for twenty nine (29) soil samples collected during the RI to determine attainment of SCOs. None of the evaluated samples contained organic or inorganic compounds at concentrations in exceedance of their respective Track 2 Residential SCOs. Residential (Track 2) SCOs were achieved for this Site.
13. Residual soil is present beneath the cover layer and will be subject to Site Management under this Remedial.
14. Performed all activities required for the Remedial Action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations.
15. Imported 110 cubic yards of processed ¾-inch recycling stone aggregates (RCA) to backfill beneath the building slab and beneath the asphalt paving of the parking space in the western portion of the Site. This RCA beneath the building slab was provided from Silva Construction and Demolition, Inc. located at 100 Riverside Avenue in Newark, New Jersey. Also imported 88 tons of processed ¾-inch recycling stone aggregates (RCA) to backfill beneath the asphalt paved parking space. This RCA was provided from Evergreen Recycling of Corona located at 125-50 Northern Boulevard in Flushing New York.
16. A total of 165 cubic yards of excavated soil during Site remedial construction was reused on-site as a backfill material. This material consisted of soil excavated at the floor of excavation for the basement layout and was reused behind sub-grade foundation walls pursuant to confirmation testing showing a slight exceedance of nickel of Track 1 SCOs.
17. Installed a Vapor Barrier System that consisted of 30-mil thick Permalon membrane by Reef Industries beneath the slab across the footprint of the building and 60-mil thick liquid Procor membrane by Grace on the building foundation sidewalls. All penetrations through the slab and walls for utility lines were sealed utilizing liquid Procor membrane. The contractor for the Vapor Barrier System construction was Braga Corp.
18. As part of development, constructed an engineered Composite Cover System consisting of 6-inch thick concrete slab beneath the new building footprint and 2-

inch thick asphalt pavement in the rear open parking space. The slab in partial basement is underlain by a 6-inch thick layer of RCA and the asphalt pavement is underlain by a 4-inch thick RCA. The contractor for the Composite Cover System construction was Braga Corp.

19. Implemented storm-water pollution prevention measures in compliance with applicable laws and regulations.
20. Submitted daily reports during construction oversight activities. Daily reports were submitted from December 7, 2015 to May 12, 2017.
21. Submitted a Sustainability Report.
22. Submitted an RAR that describes the Remedial Action, certifies that the remedial requirements defined in the Remedial Action Work Plan have been achieved; defines the Site boundaries; describes all Engineering and Institutional Controls applicable to the Site; and describes any changes from the RAWP.
23. Remediation of NYSDEC Petroleum Spill number 03-13237 is under the authority of the NYSDEC Spill program, and is pending a street opening clearance (from DOT) to install requested monitoring wells to monitor the presence of residual dissolved contaminants downgradient of the Site.
24. NYSDEC required installation of five (5) groundwater monitoring wells for monitored natural attenuation (MNA) purposes following Site remedial construction. One of the wells inside the property was installed on-Site. The remaining four (4) groundwater wells are located in sidewalks around the Site and will likely be installed following site excavation due to construction hold by DOT bridge authority who is managing construction on a bridge over railroad adjacent to Site.
25. A separate Spill closure report will be prepared following groundwater monitoring from new wells and will be submitted to NYSDEC requesting spill closure based on monitoring results. OER will issue Notice of Completion after spill is closed.

REMEDIAL ACTION REPORT

1.0 SITE BACKGROUND

Chess Builders, LLC has enrolled in the New York City Voluntary Cleanup Program (NYC VCP) to investigate and remediate a property located at 1326 Ocean Avenue in the Midwood section of Brooklyn, New York. The boundary of the property subject to this Remedial Action is shown in Figure 1 and includes, in its entirety, borough Block 6703 and Lot 55. 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 and complies with applicable environmental standards, criteria and guidance (SCGs) and applicable laws and regulations.

1.1 SITE LOCATION AND BACKGROUND

The Site is located at 1326 Ocean Avenue in the Midwood section of Brooklyn, New York and is identified as Block 6703 and Lot 55 on the New York City Tax Map. The Site is 21,237-square feet in area and is bounded by Ocean Avenue to the east, Long Island Rail Road to the south, a 6-story residential building and a 4-story residential building to the west, a 4-story residential building to the northwest and two 4-story residential buildings to the north. The Site was surrounded by a street fence along the eastern, southern and northern boundaries and a concrete wall along the western boundary. Prior to development, the Site was vacant and covered by bare soil.

A map of the site boundary is shown in Figure 2.

1.2 REDEVELOPMENT PLAN

The new development at the Site consists of a new 8-story residential building with a partial basement and rear open parking space. The building is developed in the

eastern portion for a total footprint of approximately 12,030 square feet. The partial basement is developed beneath the northern portion and central portions of the building for a total area of approximately 10,072 square feet. The partial basement is designed for use as a gym, bicycle storage, residential storage, pet spa and mechanical rooms. The building has a slab-on grade outside the perimeter of the partial basement.

The Site was excavated to the depth of 10 feet across the partial basement slab, to the depth of 12 feet for the building footings, to the depth of 2 feet 6 inches for the slab on grade and to 1 foot beneath the asphalt parking area. The excavation for the building foundations layout is a deviation from the development plan noted in the RAWP stipulations.

The entire building is capped with a 6-inch thick slab poured on top of 6-inch of backfill consisting of $\frac{3}{4}$ inch recycled stone aggregates (RCA). The rear parking lot, which covers the remainder of the site, is paved with 2-inch asphalt on top of a 4-inch thick RCA.

The new development at the Site is consistent with the NYC zoning designation R7A Residential District. A map showing the building location, basement location and open space location is shown in the Development Plan in Figure 3.

1.3 DESCRIPTION OF SURROUNDING PROPERTY

The Site is located in a residential and commercial neighborhood. Ocean Avenue and Brooklyn College Heating Plant is located to the east; Long Island Rail Road is located to the south; a 6-story residential building and a 4-story residential building are located to the west; a 4-story residential building is located to the northwest; and two 4-story residential buildings are located to the north.

Within a 500 feet radius of the Site, there are a variety of land uses including: residential (multi-story residential apartments), open spaces & outdoor recreation, public institutions and public transportation. Properties located within a 1/4-mile radius of the Site are zoned R2, R3X, R4, R4A, R5, R6 and R7A (general residential districts).

Within 250 feet radius of the Site, no sensitive receptor is identified. The surrounding land uses include residential buildings and public institutions.

1.4 SUMMARY OF PAST SITE USES AND AREAS OF CONCERN

Based upon the review of the Fire Insurance Maps and Regulatory Agency documents from previous investigations listed below:

- Phase I Environmental Site Assessment, 2003, EAI, Inc
- Limited Phase II Environmental Site Assessment, February 2004, EAI, Inc
- Tank Closure, March 2004, Don Carlo Environmental Services
- Phase I Environmental Site Assessment, June 22, 2004, Don Carlo Environmental Services
- Subsurface Investigation, August 8, 2006, Hydro Tech Environmental, Corp.
- Groundwater Investigation, January 8, 2007, Hydro Tech Environmental, Corp.
- GPR Letter, March 21, 2007, Hydro Tech Environmental Corp.
- Tank Exploration, April 30, 2007, Hydro Tech Environmental Corp.
- Phase II Site Investigation, September 28, 2007, Louis Berger & Associates, PC.
- Phase I Environmental Site Assessment, January 23, 2015, Middleton Environmental Inc.

Based on the above investigations, a Site history was established. The Site was occupied by a 1-story commercial building with a gasoline service station between 1917 and 2004. An automobile repair shop occupied the 1-story building between 1949 and 2004. The Site has been vacant since 2004.

The AOCs identified for this site included:

- The presence of open NYSDEC Spill #03-13237
- The historic use of the Site as a gas station from 1917 to early 2004;
- The presence of volatile organic compounds (VOCs) in soil, groundwater and soil vapor beneath the Site;
- The presence of historic fill material to depth ranging between 15 and 20 feet.

1.5 SUMMARY OF WORK PERFORMED UNDER THE REMEDIAL INVESTIGATION

1. Conducted a Site inspection to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);
2. Performed a Ground Penetrating Radar (GPR) survey throughout the entire Site and excavated trenches to an approximate depth of 7 to 10 feet over a grid pattern in the northwestern and southwestern portion;
3. Excavated, cleaned and removed eight (8) 550-gallon gasoline underground storage tanks (USTs) from Tank Pit 1 in the southeastern portion, two (2) 4,000-gallon gasoline underground storage tanks (USTs) from Tank Pit 2 in the northern portion and one (1) 550-gallon waste oil tank (UST) from Tank Pit 3 in the southwestern portion;
4. Collected end point samples around the closed/removed underground storage tanks (USTs) in accordance to NYSDEC DER-10. Ten (10) grab samples were taken from 16 feet bgs in the Tank Pit 1 and Tank Pit 2 while three (3) samples were submitted from Tank Pit 3, two (2) of which were composite (East/South and North/West) and the remaining one is grab (Middle). A total of thirteen (13) composite and grab soil samples were submitted from three tank areas;
5. Installed a total of twenty-eight (28) soil borings across the entire project Site, and collected a total of fifty three (53) soil samples for chemical analysis from the

soil borings to evaluate soil quality; these included eight (8) composite samples from zero to 14 feet bgs, one (1) composite sample from 3 to 15 feet bgs, one (1) composite sample from 5 to 17 feet bgs, nineteen (19) shallow samples from zero to 2 feet bgs, six (6) shallow sample from 2 to 4 feet bgs, three (3) deep samples from 10 to 12 feet, one (1) deep sample from 11 to 13 feet, three (3) deep samples from 14 to 16 feet, seven (7) deep samples from 15 to 17 feet bgs, one (1) deep samples from 32 to 35 feet bgs and two (2) deep samples from 36 to 37 feet bgs.

6. Installed a total of ten (10) groundwater monitoring wells including seven (7) wells across the Site and three (3) wells in the east-adjacent sidewalk and collected a total of ten (10) groundwater sample for chemical analysis to evaluate groundwater quality;
7. Installed seven (7) soil vapor probes around Site perimeter and collected seven (7) samples from 11 feet bgs for chemical analysis;
8. One (1) outdoor air sample was collected for chemical analysis.

1.6 SUMMARY OF FINDINGS OF REMEDIAL INVESTIGATION

1. Elevation of the property is 35 feet.
2. Depth to groundwater at the Site ranges between 33.3 and 37 feet.
3. Groundwater beneath the Site vicinity presumed to be from northwest to southeast.
4. Depth to bedrock is presumed to be in excess of 50 feet at the Site.
5. The GPR survey identified no anomalies indicative of USTs. However, the survey identified segments of buried pipes that are most likely associated with the former USTs and dispenser island at the Site.

6. The stratigraphy of the Site, from surface down to about 15-20-ft bgs, is classified as fill consisting of brown sand with varying amount of brick and pebbles. The fill layer is underlain by a layer of coarse to fine sand till the saturated zone (35-40 ft bgs).
7. Soil/fill samples collected during the remedial investigations were compared to the 6NYCRR Part 375 Track 1 Unrestricted Use Soil Cleanup Objectives (SCOs) as well as to Track 2 Restricted Residential Use SCOs. Soil/fill samples collected during RI showed seven VOCs including 1,2,4-trimethylbenzene (max. 790 mg/kg or mg/kg), 1,3,5-trimethylbenzene (max. 240 mg/kg), ethyl benzene (max. 57 mg/kg), n-propylbenzene (max. 83 mg/kg), o-xylene (max. 190 mg/kg), sec-butylbenzene (max. 24 mg/kg) and toluene (max. 13 mg/kg) were detected at concentrations exceeding their respective Track 1 SCOs in 1 shallow and 4 deep soil samples. Of these VOCs, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, ethyl benzene and o-xylene also exceeded Track 2 SCOs in the shallow soil sample. Chlorinated VOCs including PCE and TCE did not occur in any soil samples. Acetone (max. 0.12 mg/kg), was detected at concentrations exceeding its respective Track 1 SCOs in two deep soil samples. Eight SVOCs including benzo(a)anthracene (max. of 4.6 mg/kg), benzo(a)pyrene (max. of 3.2 mg/kg), benzo(b)fluoranthene (max. of 3.9 mg/kg), benzo(k)fluoranthene (max. of 2.01 mg/kg), chrysene (max. of 1.27 mg/kg), dibenzo(a,h)anthracene (1.1 mg/kg), Indeno(1,2,3-cd)pyrene (max. of 2 mg/kg) and naphthalene (max. of 41 mg/kg) were detected at concentrations exceeding their respective Track 1 SCOs in five shallow soil samples and one deep soil sample. Of these SVOCs, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(k)fluoranthene, dibenzo(a,h)anthracene, and Indeno(1,2,3-cd)pyrene were also detected at concentrations exceeding their respective Track 2 SCOs in four shallow soil samples and the deep sample. Two pesticides including 4,4'-DDE (max. of 0.031 mg/kg) and 4,4'-DDT (max. of 0.0083 mg/kg) occurred at concentrations exceeding their Track 1 SCOs in two shallow soil samples. Total PCB was detected below its Track 1 SCO in one of the shallow soil samples. Seven metals,

including; arsenic (max. of 15 mg/kg), barium (max. of 850 mg/kg), copper (max. of 55.70 mg/kg), lead (max. of 220 mg/kg), nickel (max. of 49.90 mg/kg), mercury (0.60 mg/kg) and zinc (max. of 680 mg/kg) were identified at concentrations exceeding Track 1 Unrestricted SCOs in fourteen shallow and seventeen deep soil samples. Of these metals, barium also exceeded its Track 2 SCOs in one shallow sample. Overall, the VOC findings were consistent with historic use of the Site as a gasoline filling station and the PAHs and metal findings are consistent with observations for historic fill sites in areas throughout NYC.

8. Groundwater samples collected during the RI were compared to the 6NYCRR Part 703.5 Groundwater Quality Standards (GQS). Groundwater results showed several petroleum related VOCs including 1,2,4-trimethylbenzene (max. 960 µg/l), 1,3,5-trimethylbenzene (max. 160 µg/l), benzene (max. 25 µg/L), ethylbenzene (max. 840 µg/L), isopropylbenzene (max. 140 µg/L), n-butylbenzene (max. 28 µg/L), n-propylbenzene (max. 370 µg/L), o-xylene (max. 770 µg/L), sec-butylbenzene (max. 34 µg/L), tert-butylbenzene (max. 84 µg/L) and toluene (max. 340 µg/L) detected at concentrations exceeding GQS in four samples. The chlorinated solvents PCE and TEC did not occur in any groundwater samples, however, the PCE derivative 1,1,1,2-Tetrachloroethane (max. 1,500 µg/L) was detected at a concentration exceeding its GQS in three samples. The SVOC Naphthalene (max. 79 µg/L) was detected at concentrations exceeding GQS in three groundwater samples. Dissolved metals including magnesium (max. 54,000 µg/L), manganese (max. 3,600 µg/L) and sodium (max. 83,000 µg/L) were detected at concentrations exceeding GQS. No pesticides or PCBs were detected in the groundwater samples.
9. Soil vapor results collected during the RI show a wide range of compounds throughout the property including BTEX and associated petroleum related compounds as well as chlorinated hydrocarbons. BTEX and associated derivatives were found in all vapor samples and include a wide number of compounds. The concentration of these compounds range from 0.38 micrograms

per cubic meter (ug/m^3) to $21 \text{ ug}/\text{m}^3$. Chlorinated hydrocarbons were also commonly detected in all soil vapor samples at concentrations that are well below the NYSDOH guidance. Detected chlorinated hydrocarbons included PCE (max. $2.60 \text{ ug}/\text{m}^3$), TCE (max. $0.51 \text{ ug}/\text{m}^3$), chloroform (max. $1.10 \text{ ug}/\text{m}^3$), methylene chloride (max. $22 \text{ ug}/\text{m}^3$) and acetone (maximum $1,700 \text{ ug}/\text{m}^3$). BTEX and chlorinated hydrocarbons including PCE ($0.95 \text{ ug}/\text{m}^3$), TCE (max. $0.51 \text{ ug}/\text{m}^3$) are detected in the outdoor at trace concentration.

Appendix 1 includes the RIR.

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: Three Phase I investigations were conducted in 2003, 2004 and 2015. A Pre-Application Meeting was held on February 18, 2015. Limited Phase II investigation were conducted in 2004 and 2006, and a Remedial Investigation (RI) was performed from June 2007 to March 2015. 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 April 22, 2015 for a 30-day public comment period. The RAWP and Stipulation Lists dated April 27, 2015 and February 22, 2016 were then approved by the New York City Office of Environmental Remediation (OER). Site briefings was conducted with New York State Department of Environmental Conservation (NYSDEC) in February 2015. NYSDEC Spill Division was briefed in March 2015 and approved remedial action on April 27, 2015. A Pre-Construction meeting was held on September 21, 2015. A Fact Sheet providing notice of the start of the remedial action was not issued. The remedial action was begun on December 7, 2015 and completed on May 12, 2017. Appendix 2 includes the RAWP. Appendix 3 includes the RAWP Stipulation Lists.

The remedial action consisted of the following tasks:

1. Prepared a Community Protection Statement and implemented a Citizen Participation Plan.
2. Mobilized (November 2015) site security and equipment; completed utility mark outs; and marked and staked excavation areas.

3. Performed Waste Characterization Study prior to excavation activities. Five (5) waste characterization soil samples were collected on April 30, 2015, May 1, 2015 and February 15, 2016. Waste characterization samples were collected at a frequency dictated by disposal facility(s).
4. Performed a Community Air Monitoring Program for particulates and volatile organic carbon compounds.
5. Selected NYSDEC Part 375 Established Track 4 Site Specific Soil Cleanup Objectives (SCOs). The Site-Specific SCOs utilized for this project are the following: total VOCs (10 ppm), total SVOCs (250 ppm), barium (750 ppm), lead (1,000 ppm) and mercury (1.5 ppm).
6. The following excavations were performed: soil was removed
 - a. to a depth of 10 from grade beneath the partial basement;
 - b. to a depth of 12 feet from grade for localized basement footings;
 - c. to a depth of 2.5 feet from grade beneath the area of the slab-on grade outside the perimeter of the partial basement; and
 - d. to a depth of 8 feet bgs within the limits of three 7-foot diameter drywells installed in the rear parking area.
7. Screened excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID. No organic vapors (<0.1 ppm) or visual/olfactory evidence of contamination were identified in the excavated soil at the Site.
8. 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. This task was completed in accordance with the Soil Material Management Plan in the RAWP.
9. 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. A total of 9,544.66 tons of soil/fill were excavated and removed from the property. Breakdown is:

- a. excavated 5,827.27 tons of non-hazardous soil/fill and transported it to Impact Recovery and Reuse Center located at 1000 Page Avenue in Lyndhurst, New Jersey;
 - b. excavated 2,627.52 tons of non-hazardous soil/fill and transported to PPark NJ, LLC (PPark) located at 100 Platen Avenue in Prospect Park, New Jersey ;
 - c. excavated 1,089.87 tons of non-hazardous soil/fill and transported it to Pure Soil of Perth Amboy located at 1160 State Street in Perth Amboy, New Jersey;
 - d. removed 114.94 tons of former and concrete footings were disposed as construction and demolition (C&D) material at Allocco Recycling Ltd, at 540 Kingsland Avenue in Brooklyn New York; and
 - e. Removed 154.40 tons of C&D materials and disposed at Regal Recycling Company, Inc. located at 172-06 Douglas Avenue, Jamaica, New York .
10. Removed two (2) 1080-gallon number 2 fuel oil USTs and one (1) 550-gallon number waste oil UST beneath the western and southern portions of the Site during excavation activities in compliance with applicable laws and regulations. A total of 2,216 gallons of liquid was removed from the USTs by a Vacuum Truck and disposed at a licensed facility by Rapid Waste Disposal, Inc. located at 444 Tiffany Avenue in Bronx, NY. FDNY tank removal affidavit was obtained and all tanks were registered and closed with NYSDEC (PBS # 2-191620).
11. After the removal of above three USTs, one (1) end-point soil sample was collected from the bottom of UST-1 excavation (in the western portion) and five endpoint soil samples from beneath each of the UST-2 and UST-3 excavations (in the western and southern portions). The endpoint samples detected traces of VOCs and/or SVOCs in two of 11 samples, at concentrations that were below Unrestricted Use SCOs.
12. Collected and analyzed four (4) end-point samples at the excavation floor and evaluated data for twenty nine (29) soil samples collected during the RI to determine attainment of SCOs. None of the evaluated samples contained organic

- or inorganic compounds at concentrations in exceedance of their respective Track 2 Residential SCOs. Residential (Track 2) SCOs were achieved for this Site.
13. Residual soil is present beneath the cover layer and will be subject to Site Management under this Remedial.
 14. Performed all activities required for the Remedial Action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations.
 15. Imported 110 cubic yards of processed $\frac{3}{4}$ -inch recycling stone aggregates (RCA) to backfill beneath the building slab and beneath the asphalt paving of the parking space in the western portion of the Site. This RCA beneath the building slab was provided from Silva Construction and Demolition, Inc. located at 100 Riverside Avenue in Newark, New Jersey. Also imported 88 tons of processed $\frac{3}{4}$ -inch recycling stone aggregates (RCA) to backfill beneath the asphalt paved parking space. This RCA was provided from Evergreen Recycling of Corona located at 125-50 Northern Boulevard in Flushing New York.
 16. A total of 165 cubic yards of excavated soil during Site remedial construction was reused on-site as a backfill material. This material consisted of soil excavated at the floor of excavation for the basement layout and was reused behind sub-grade foundation walls pursuant to confirmation testing showing a slight exceedance of nickel of Track 1 SCOs.
 17. Installed a Vapor Barrier System that consisted of 30-mil thick Permalon membrane by Reef Industries beneath the slab across the footprint of the building and 60-mil thick liquid Procor membrane by Grace on the building foundation sidewalls. All penetrations through the slab and walls for utility lines were sealed utilizing liquid Procor membrane. The contractor for the Vapor Barrier System construction was Braga Corp.
 18. As part of development, constructed an engineered Composite Cover System consisting of 6-inch thick concrete slab beneath the new building footprint and 2-inch thick asphalt pavement in the rear open parking space. The slab in partial basement is underlain by a 6-inch thick layer of RCA and the asphalt pavement is

underlain by a 4-inch thick RCA. The contractor for the Composite Cover System construction was Braga Corp.

19. Implemented storm-water pollution prevention measures in compliance with applicable laws and regulations.
20. Submitted daily reports during construction oversight activities. Daily reports were submitted from December 7, 2015 to May 12, 2017.
21. Submitted a Sustainability Report.
22. Submitted an RAR that describes the Remedial Action, certifies that the remedial requirements defined in the Remedial Action Work Plan have been achieved; defines the Site boundaries; describes all Engineering and Institutional Controls applicable to the Site; and describes any changes from the RAWP.
23. Remediation of NYSDEC Petroleum Spill number 03-13237 is under the authority of the NYSDEC Spill program, and is pending a street opening clearance (from DOT) to install requested monitoring wells to monitor the presence of residual dissolved contaminants downgradient of the Site.
24. NYSDEC required installation of five (5) groundwater monitoring wells for monitored natural attenuation (MNA) purposes following Site remedial construction. One of the wells inside the property was installed on-Site. The remaining four (4) groundwater wells are located in sidewalks around the Site and will likely be installed following site excavation due to construction hold by DOT bridge authority who is managing construction on a bridge over railroad adjacent to Site.
25. A separate Spill closure report will be prepared following groundwater monitoring from new wells and will be submitted to NYSDEC requesting spill closure based on monitoring results. OER will issue Notice of Completion after spill is closed.

3.0 COMPLIANCE WITH REMEDIAL ACTION WORK PLAN

3.1 CONSTRUCTION HEALTH & SAFETY PLAN

The remedial construction activities performed under this program were in compliance with the Construction Health and Safety Plan and applicable laws and regulations. The Site Safety Coordinator was Eli Hoffman of SLCE Group.

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 4.

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 with the SMMP in the approved RAWP.

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.

3.5 DEVIATIONS FROM THE REMEDIAL ACTION WORK PLAN

1. 30-mil HDPE geomembrane vapor barrier manufactured by GSE was proposed to be installed horizontally beneath the building slab and a 69-mil Bituthene® 3000 vapor barrier manufactured by Grace was proposed to be installed vertically on the sidewalls of the partial basement. The vapor barrier installed beneath the building slab consisted of 30-mil thick Permalon membrane by Reef Industries beneath the slab across the footprint of the building and 60-mil thick liquid Procor membrane by Grace on the building foundation sidewalls. This change in the type of vapor barrier used was discussed with and approved by OER. These vapor barrier products will prevent potential exposures from soil vapor and will provide protection of both the public health and the environment;
2. A detention tank was designed for storm water management within the perimeter of the partial basement. This tank was then eliminated and replaced with three drywells installed rear parking space that were not documented in the RAWP. The design of the three dry wells was shown on the final building plans of the new development. This excavation was performed to the depth of 8 feet within the limits of three isolated 7-foot diameter drywell prior to backfill placement and asphalt capping. The excavation did not generate a significant amount of soil, which was reused on-site for grading activities in rear parking area. This deviation was not communicated with OER for approval.
3. The site excavation was documented in the RAWP to a depth of 10 feet 7 inches for the for the partial basement layout, to 2 feet beneath the building slab on-grade portion. Actual excavation at the Site was performed to the depth of 10 feet across the slab of partial basement, to the depth of 12 feet for the localized footings and to the depth of 2.5 feet for the slab on-grade. This deviation was not communicated with OER for approval.
4. The quantity of soil destined for on-site reuse was specified in the RAWP at 50 tons. Actual quantity of reused on-site soil was estimated at around 165 cubic yards. This soil consisted of material excavated at the floor of excavation and was

- temporarily stockpiled around the site to backfill behind foundation walls of partial basement. This soil was reused pursuant to a composite sampling and laboratory analytical testing, which indicated nickel was the only detected compound at a concentration exceeding the Track 1 SCO but below the Track 2 SCOs. This deviation was communicated with OER.
5. According to the RAWP, a CAMP shall be performed during invasive activities at an upwind and downwind locations, simultaneously. However, since the Site between is surrounded by tall buildings to the north and west acting as a buffer to upwind circulation, the CAMP was reduced to downwind location only. This deviation was communicated with OER.
 6. Proposed remedial objective for this Site consisted of Track 4 Unrestricted SCOs. Post-remediation residual soil quality beneath the Site was evaluated with 4 post-excavation end-point soil samples, 13 soil samples collected during the RIR at depths corresponding to the floor of excavation and 11 endpoint samples collected in the vicinity of closed and removed USTs. Acetone (max. 0.12 ppm) and lead (max. 69 ppm) were detected in two distinct RI soil samples and nickel (max 220 ppm) was detected in 16 RI soil samples and in the post-excavation at concentrations slightly exceeding their respective Track 1 USCOs of 0.05 ppm, 63 ppm and 30 ppm but were below their respective Track 2 Residential SCO of 100 ppm, 400 ppm, and 310 ppm. No other soil samples, evaluated following the Site remedial cleanup, were detected at concentrations in exceedance of their respective Track 1 Unrestricted SCOs or Track 2 Restricted Residential SCOs. On the basis of this evaluation, the remedial action at the Site has achieved the Track 2 Residential SCOs. OER confirmed this deviation.
 7. A demarcation layer was not included on site, because Track 2 Restricted Residential SCOs were achieved.
 8. According to the RAP, daily reports frequency can be reduced in consultation with OER in the event no invasive work or remedial activities are performed for extended time period. The daily report frequency in fact was reduced to a weekly report documenting the disposal of C&D during last quarter of December 2015 and the import of RCA for placement under the asphalt parking space during the

- first quarter of May 2017, to a bi-weekly report documenting the import and placement of RCA beneath building slab during first half of May 2016 and to a monthly report documenting the aboveground construction during July 2016. The change in the frequency of daily report was not coordinated with the OER.
9. A complaint was filed electronically to OER by Mr. J. Weiss on February 24, 2016. The complaint included several issues related to permitting, deviation from development plans, posting DOB permits, and a picture of unsafe pedestrian crossing condition during soil excavation and disposal. OER communicated this complaint with Hydro Tech, Chess Builders, LLC. During a teleconference with OER on February 26, 2016, a representative of Chess Builders, LLC indicated that he is well acquainted with Mr. J. Weiss, whose complaint is unfounded and is caused by a dispute over a lost contract for construction at the Site. The representative of Chess Builders confirmed that no DOB violations related to construction exist at the Site and pictures with evidence of Site safety measures during construction were provided to OER.

Appendix 5 provides correspondences with OER regarding approved deviations and Site-related complaint.

4.0 REMEDIAL PROGRAM

4.1 PROJECT ORGANIZATION

Principal personnel who participated in the remedial action included Paul I. Matli, Project Geologist. The Professional Engineer (PE) and Qualified Environmental Professionals (QEP) for this project are Shaik Saad and Mark E. Robbins, respectively. The General Contractor who oversaw all phases of Site remedial excavation and construction was Chess Builders LLC.

Remedial activities at the Site were overseen by NYCOER under the VCP in accordance with the April 2015 RAWP addressing the HAZMAT E-designation (E-159; CEQR 06DCP030K) (NYC VCP Project Number 15CVCP125K and E-Designation Project Number 15EHAZ434K). The NYC OER Project Manager is Katherine Glass. The closure proceedings of NYSDEC Spill number 0313237 is being pursued by Andre Obligado of the Division of Environmental Remediation in New York City - Region 2.

4.2 SITE CONTROLS

Site Preparation

Prior to and throughout the different phases of remedial activities, all necessary construction permits were acquired and maintained on-site as per as per the New York City Department of Buildings (NYCDOB) rules and regulations. No site clearing and site grubbing of organic matter (wood, roots, stumps, etc.) or other solid waste were required prior to all remedial work.

Prior to the start of remedial activities, a pre-construction meeting was held with all contractors during September 2015. Fencing around the site perimeter was performed following acquisition of necessary NYCDOB permits during October 2015. An OER Project Notice was erected at the project entrance and was in place during all phases of the Remedial Action.

Soil Screening

All excavated soil was examined for visual/olfactory evidence of petroleum contamination and for organic vapors utilizing a Photoionization Detector (PID) Paul I. Matli, Project Geologist. The soil screening was performed on soil samples collected randomly from the excavator bucket during live loading or stockpiling of excavated material. No organic vapors (<0.1 ppm) or visual/olfactory evidence of contamination were identified in the excavated soil at the Site.

Stockpile Management

Soil excavated during remedial Site development was either live-loaded directly into trucks and transported off-site or temporarily stockpiled in the vicinity of open excavations until it was then loaded into trucks or reused for backfill. Soil stockpiles were placed directly on 6-mil poly-sheeting and covered at all times with appropriately anchored plastic tarps. This task was completed in accordance with the Soil Material Management Plan in the RAWP.

Truck Inspection

Truck inspection and cleaning was performed for all trucks prior to exiting the site. A trucking pad consisting of minimum 6 inches of RCA aggregates was laid at the entrance to the Site from Ocean Avenue to the east. Trucks hauling contaminated soil/fill material were inspected prior to leaving the Site for any debris adhering to their surface. Trucks also went through thorough cleaning including brushing and rinsing their tires with water, when necessary, in order to prevent any tracking of soil/fill into surrounding community. Hauling trucks were also covered in order to control the generation of fugitive dust and leakage of contaminated material during transport.

Site Security

Site security was maintained with a locked fence in accordance with the NYCDOB code.

Nuisance Controls

All necessary means were employed to prevent dust, odor and vapor nuisances during the remedial excavation and disposal of soil/fill material and the closure and removal of USTs. Such measures included shrouding stockpiled material with plastic tarp and a supply of water from the nearest fire hydrant to apply sprinkled water over dry surfaces to reduce dust generation and other provisions for mist applications of odor chemical solutions to suppress potential odor and vapors.

It should be noted that a complaint associated with unsafe pedestrian crossing condition during soil excavation was filed to OER on February 24, 2016 and was discussed in Section 3.5. Representatives of Chess Builders confirmed that this complaint is unfounded and is caused by a dispute with the complainer over a lost contract for construction at the Site. Evidence of strict Site safety measures implemented since the start of remedial construction was then provided to OER in the form of photographs taken during site remedial activities.

No odors, dust or vapors were generated or identified during remedial work.

Reporting

Daily reports providing a general summary of invasive and other remedial activities were provided to the OER Project Manager for each day of active remedial work by Paul I. Matli. The daily report frequency was reduced to a weekly report documenting the disposal of C&D during last quarter of December 2015 and the import of RCA for placement under the asphalt parking space during the second quarter of May 2017, to a bi-weekly report documenting the import and placement of RCA beneath building slab during first half of May 2016 and to a monthly report documenting the aboveground construction during July 2016. Daily, weekly and monthly reports were submitted from December 7, 2015 to May 12, 2017 and excluded periods of no invasive activities during 2015, 2016 and 2017.

All daily, weekly and monthly reports are included in Appendix 6. Digital photographs of the Remedial Action are included in Appendix 7.

4.3 MATERIALS EXCAVATION AND REMOVAL ACTION

Soil/Fill Excavation and Removal

The soil across the entire perimeter was excavated utilizing Komatsu PC220-2 hydraulic excavator and was removed to variable depths; to a depth of 10 from grade beneath the partial basement, to a depth of 12 feet from grade for localized basement footings, to a depth of 2.5 feet from grade beneath the area of the slab-on grade outside the perimeter of the partial basement and to a depth of 1 foot from grade and beneath the area of the rear open parking space. A total of number 9,544.66 tons of soil/fill impacted with VOCs, SVOCs and metals were excavated and removed from the property during the Removal Action. The quantity of soil reused on-site is 165 cubic yards. The Removal Action was performed under the oversight of Shaik Saad P.E., and Mark E. Robbins.

The Site excavation proceeded by first removing the top 2.5 feet from grade across the entire Site from December 7, 2015 to February 18, 2016. Deep excavation then proceeded within the perimeter of the partial basement to the depths of 10 feet and 12 feet below grade from February 19, 2016 to May 16, 2015. During this period, soil removed from the bottom of the excavation of the partial basement was temporarily stockpiled around the site for on-site reuse. Additionally, localized excavations were performed for the removal of USTs to the depths of 5 feet and 6.5 feet below grade in the western portion on December 14, 2015 and in the western and southern portions on February 12, 2016. Localized excavation also occurred in the areas of drywells to the depth of 8 feet below grade in the rear parking space on February 9, 2017. The drywell excavation generated minor volume that was re-used for grading activities in the rear parking space. No groundwater was encountered during the Site excavation. End points samples were collected over 24 hours after completing the excavation.

Table 1 provides disposal quantities and disposal facilities. A map showing the approximate locations where excavations were performed and approximate depth of excavated material is shown in Figure 4.

Onsite Reuse

Soil removed at the floor of excavation of the partial basement was temporarily stockpiled around the site and then used to backfill behind foundation walls of partial basement. The reuse of on-site soil was performed in consultation with OER and pursuant to a composite sampling analysis, which indicated nickel was the only detected compound at a concentration exceeding the Track 1 SCO but below the Track 2 SCOs. Additional reuse of on-site soil also occurred in the rear parking space with material removed during the excavation of three drywells. The drywell excavation generated a minor volume of soil that was re-reused for grading activities in the rear parking space. The estimated quantity of reused on-site soil is approximately 165 cubic yards. The reuse of this soil in this area was not coordinated with OER and was not tested prior this action. However, based on the RI data, this soil is not suspected to contain any compounds om exceedance of Track 2 SCOs.

A map showing the approximate source location of reused soil and the location of placement of reused soil is shown in Figure 4. Table 1 provides the results of reused on-site soil. Laboratory report of analytical results of reused on-site soil is provided in Appendix 8

UST Removal

One (1) 1080-gallon umber 2 fuel oil UST (UST-1) was closed on December 14, 2015 and removed from the western portion of the Site and one (1) 550-gallon number waste oil UST (UST-2) and one (1) 1080-gallon umber 2 fuel oil UST (UST-3) were closed on February 12, 2016 and removed from the western and southern portions of the Site, respectively. All three tanks were closed by Hydro Tech Environmental, Corp. during remedial soil excavation activities. All three tanks were buried in dirt at 3 feet bgs. Following the exposure of the tanks, their interior was inspected through their fill ports. All tanks were found empty with only a residual level of petroleum mixed with water in their bottom. All liquid was removed from the USTs through their fill ports utilizing a Vacuum Truck. Following content removal, the tanks were excavated utilizing the bucket of excavator and placed on poly sheeting and securely covered until disposal. No visible

evidence of holes associated with corrosion was noted on the tanks. No evidence of petroleum contamination was identified during the removal of the three USTs. The tanks carcasses were disposed of as scrap metal at TNT Scrap Metal located at 340 Maspeth Avenue in Brooklyn, NY. At the conclusion of the USTs closure activity, one (1) end-point soil sample was collected from the bottom of UST-1 excavation at in the western portion in accordance with OER directions and five endpoint soil samples were collected beneath each of the UST-2 and UST-3 excavations in the western and southern portions accordance with DER-10. The endpoint samples were designated as EP-UST-1, EP-UST2-1 through EP-UST2-5 and EP-UST3-1 through EP-UST3-5 and were analyzed for VOCs by EPA Method 8260 and SVOCs by EPA Method 8270. VOCs or SVOCs were detected in two the USTs end-point samples at concentrations below Track 1 UUSCOs.

A total of 2,216 gallons of waste liquids was removed by a vacuum truck and properly disposed of at a licensed facility by Rapid Waste Disposal, Inc. located at 444 Tiffany Avenue in Bronx, NY.

The three closed and removed tanks during Site remedial activities were properly registered with the NYSDEC Petroleum Bulk Storage (PBS) unit as closed - removed under PBS # 2-191620.

The approximate location of USTs are shown in Figure 4. FDNY tank removal affidavits and PBS registration of the tanks are included in Appendix 9. Copies of the liquid disposal manifest are provided in Appendix 10. A tabular summary of UST end-point sampling results is included in Table 2. Laboratory report of the UST end-point samples is provided in Appendix 11.

NYSDEC Petroleum Spill

The NYSDEC Petroleum Spill Number is 03-13237 remains open and is will be addressed under the authority of the NYSDEC Spill program. The NYSDEC decision for spill closure following site remediation is pending as a result of delays in fulfilling NYSDEC requirements to install and sample three off-site monitoring wells to monitor the presence of residual dissolved contaminants downgradient of the Site. The delay in installing and sampling the off-site monitoring wells has been caused by a Bridge Hold issued by NYC DOT's Division of Bridges for repairs on the southeast-adjacent bridge

over Long Island Rail Road to the south and other delays related to restricted access associated with the placement of scaffolding over the east-adjacent sidewalk along Ocean Avenue.

Correspondences associated with the NYS DEC Petroleum Spill is located in Appendix 12.

Soil Cleanup Objectives

The SCO for this Site are listed included in 6 NYCRR Part 375, Table 6.8(b) as amended by the following Track 4 Site-Specific SCOs:

<u>Contaminant</u>	<u>Site-Specific SCOs</u>
Total VOCs	10 ppm
Total SVOCs	250 ppm
Barium	750 ppm
Lead	1000 ppm
Mercury	1.5 ppm

Based on results of endpoint samples, Track 2 Restricted Residential SCOs were achieved.

End Point Sample Results

Four (4) post excavation end-point samples designated EP-1 to EP-4 were collected from the bottom of excavation in compliance with the RAWP stipulation list dated February 22, 2016. The RI provided data for twenty nine (29) soil samples, with thirteen (13) samples were collected as end-point samples in during historic tank closure activities at the depth of 16 feet below grade surface and sixteen samples were collected from soil probes fourteen at depth intervals ranging between 10 feet and 17 feet.

The four endpoint samples and twenty nine RI samples were analyzed for VOCs by EPA Method 8260, SVOCs by EPA Method 8270. Sixteen RI samples and the end-point

sample EP-1 were also analyzed for Target Analyte List metals. In addition, EP-1 was also analyzed for Pesticides/PCBs by EPA Method 8081/8082.

Analytical results for all these samples were compared to the 6NYCRR Part 375, Table 6.8(b) Track 1 UUSCOs and Track 2 Restricted Residential Use SCOs amended with the Site specific Track 4 SCOs.

Evaluation of post-excavation end point samples results and RI samples results indicated three individual compounds were detected in residual soil beneath the Site at concentrations exceeding the Track 1 UUSCOs but below the Restricted Residential SCOs and the Site specific Track 4 SCOs. The detected compounds in exceedance of Track 1 UUSCOs included acetone (max 0.12 ppm) in one RI sample, nickel (max 220 ppm) in 16 RI samples and 4 end-point samples and lead (max 69 ppm) in one RI sample. None of the evaluated samples, following the Site remedial cleanup, including the post-excavation end-point samples and the deep soil samples collected during the RI contained organic or inorganic compounds at concentrations in exceedance of their respective Track 2 Restricted Residential SCOs. On the basis of this evaluation, the remedial action at the Site has achieved the Track 2 Residential SCOs.

A map of end-point sample locations is shown in Figure 5. A tabular summary of the results of post-excavation end-point samples and also the RI samples collected at depths below the floor of excavation were compared to SCOs and included in Table 3 and Table 4, respectively. Full laboratory reports of end-point samples results are included in Appendix 13.

4.4 MATERIALS DISPOSAL

The material type, quantity and disposal location of material removed and disposed off-Site is presented below:

Excavated 5,827.27 tons of non-hazardous soil/fill and transported it to Impact Recovery and Reuse Center located at 1000 Page Avenue in Lyndhurst, NJ, excavated 2,627.52 tons of non-hazardous soil/fill and transported to PPark NJ, LLC. (PPark) located at 100 Platen Avenue in Prospect Park, NJ and excavated 1,089.87 tons of non-hazardous soil/fill and transported it to Pure Soil of Perth Amboy located at 1160 State

Street in Perth Amboy, NJ. A total of 114.94 tons of former and concrete footings were disposed as construction and demolition (C&D) material at Allocco Recycling Ltd. Located at 540 Kingsland Avenue in Brooklyn NY and 154.40 tons of C&D were disposed at Regal Recycling Company, Inc. located at 172-06 Douglas Avenue, Jamaica, NY.

Disposal Location/Address	Type of Material	Quantity
Impact Recovery and Reuse Center located at 1000 Page Avenue in Lyndhurst, NJ	Non-Hazardous Soil	5,827.27 tons
PPark NJ, LLC. (PPark) located at 100 Platen Avenue in Prospect Park, NJ	Non-Hazardous Soil	2,627.52 tons
Pure Soil of Perth Amboy located at 1160 State Street in Perth Amboy, NJ	Non-Hazardous Soil	1,089.87 tons
Regal Recycling Company, Inc. located at 172-06 Douglas Avenue, Jamaica, NY.	Construction & Demolition Waste	154.40 tons
Allocco Recycling Ltd. Located at 540 Kingsland Avenue in Brooklyn NY	Construction & Demolition Waste	114.94 tons

Correspondence from Chess Builders, LLC via Hydro Tech to disposal facilities providing materials type, source and data, and acceptance letters from disposal facilities stating it is approved to accept above materials are attached in Appendix 14. Manifests are included in Appendix 15. A table of individual truck transport and material disposal quantities is included in Table 5.

4.5 BACKFILL IMPORT

As part of remedial construction activities, a layer consisting of $\frac{3}{4}$ inch Recycling Stone Aggregate (RCA) was required beneath the partial basement slab for structural related purposes. In addition, $\frac{3}{4}$ inch RCA backfill was required beneath the asphalt paved rear parking area in the western portion of the Site.

Six (6) loads with a total of 110 cubic yards of $\frac{3}{4}$ -inch recycling stone aggregates (RCA) were brought to the site to establish a 6-inch layer under the mat slab in the partial basement. The recycling stone aggregates was provided from Silva Construction and Demolition, Inc. located at located at 100 Riverside Avenue in Newark, New Jersey.

Three (3) loads with a total of 88 tons of recycling stone aggregates was also brought to the Site to establish a 4-inch layer under beneath the asphalt paved rear parking area. The RCA was provided from Evergreen Recycling of Corona located at 125-50 Northern Boulevard in Flushing New York.

Table 6 provides backfill quantity and sources. Appendix 16 provides information on the import of recycling stone aggregates and RCA backfill. A map showing backfill placement locations at the Site is shown in Figure 6 and also in As-build plans in Appendix 17.

4.6 DEMARACTION

Track 2 Residential SCOs were achieved for soil and a demarcation layer was not required.

5.0 ENGINEERING CONTROLS

The site achieved Track 2 Residential Use SCOs for soil, and Engineering Controls were not required. However, the following construction elements implemented as part of new development constitute protective controls:

- (1) A Composite Cover System; and
- (2) Vapor Barrier System.

Composite Cover System

The composite cover system, installed as part of the development, is comprised of concrete building slab, which consists of an 6-inch thick slab poured on top of a 6-inch thick recycling stones aggregates beneath the basement and on top on-site soil outside the partial basement perimeter and a 2-inch thick asphalt pavement installed on top of 4 -inch thick RCA layer. The contractor for the cover construction was Braga Corp. located at 98 Snediker Avenue in Brooklyn, NY.

Vapor Barrier System

The vapor barrier system consists 30-mil thick Permalon membrane by Reef Industries beneath the slab across the footprint of the building and 60-mil thick liquid Procor membrane by Grace on the building foundation sidewalls. All penetrations through the slab and walls for utility lines were sealed utilizing liquid Procor membrane. The contractor for the Vapor Barrier System construction was Braga Corp.

Figure 6 shows the as-built engineering diagram for the Vapor Barrier System used on this Site. Photographs of installation of the Vapor Barrier System are included in Appendix 7. Vapor barrier system information including a copy of manufacturer's specifications, purchase receipts and contractor installation affidavit are included in Appendix 18.

6.0 INSTITUTIONAL CONTROLS

A Track 2 Residential SCOs Remedial Action was achieved and Engineering Controls and Institutional Controls are not required.

7.0 SITE MANAGEMENT PLAN

A Track 2 Residential SCOs Remedial Action was achieved and Site Management is not required.

8.0 SUSTAINABILITY REPORT

This Remedial Action provided for sustainable remediation through a variety of means that are defined in this Sustainability Report.

Reuse of Clean, Recyclable Materials and Conservation of Natural Resources. 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.

Conservation of non-renewable resources was achieved by importing recycling stone aggregates and reusing on-site soil. An estimate of the quantity of recycled material reused on this project is approximately 223 cubic yards. An estimate of the quantity of reused on-site soil on this project is approximately 165 cubic yards.

Conversion to Clean Fuels. Use of clean fuel improves NYC's air quality by reducing harmful emissions.

Natural gas is utilized as the principal fuel in the new building.

Recontamination Control. Recontamination after cleanup and redevelopment is completed 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 contamination from off-Site.

The area of the Site that utilizes recontamination controls under this plan is 21,237 square feet.

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.

An estimate of area of the property for which enhanced storm-water retention capability has been established for the redevelopment project is 8,800 square feet.

Paperless Brownfield Cleanup Program. Chess Builders, 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 100 pounds.

Low-Energy Project Management Program. Chess Builders, 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 400 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 five.