388 Bridge Street
Brooklyn, New York

NYSDEC BCP Site No. C224134

2016 ANNUAL PERIODIC REVIEW REPORT AND ENGINEERING CERTIFICATION

ARNOLD F. FLEMING P.E.

&

Fleming Lee Shue

Environmental Management & Consulting

158 West 29th Street, 9th Floor
New York, NY 10001
(212) 675-3225

FLS Project Number: 10149-001

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EXECUTIVE SUMMARY

This Periodic Review Report (PRR) documents the activities subject to the Site Management Plan (SMP) for 388 Bridge Street (Site) for calendar year 2016. The Site is comprised of Brownfield Cleanup Program (BCP) Site C224134 and administered by the New York State Department of Environmental Conservation (NYSDEC). The engineering and institutional controls (EC/IC) were implemented and were maintained in accordance with the NYSDEC-approved SMP for BCP Site No. C224134 (December 2013).

The purpose of this PRR and Annual Certification is to document on-going Site management activities associated with the permanent ECs and ICs in place at the Site, and to certify that these controls are being maintained in accordance with the Brownfield Cleanup Agreement (BCA).

The Site management activities conducted in 2016 include the following:

- Removal of the on-Site soil vapor extraction (SVE) system installed in 2013 and installation of a new, downsized SVE system;
- Converting five of the six on-Site SVE extraction wells to groundwater monitoring wells;
- Abandoning two of the monitoring wells and beginning the semi-annual groundwater sampling program;
- Routine system inspections of the on-Site SVE system;
- Routine system check of the sub-slab depressurization system (SSDS), a component of the vapor mitigation system implemented at the Site;
- Routine system check of the off-Site ECs including the SSDS and basement pressurization system (BPS), components of the vapor mitigation systems implemented at Saint Joseph's High School (SJHS);
- Visual inspection of the basement floor and perimeter for signs of vapor intrusion;
- Visual inspection of the concrete slab to determine the absence of cracks and fissures.

The implementation of remedial action, Site management activities, and continuous media monitoring were performed by FLS in 2016 under direct supervision of Arnold F. Fleming P.E. It was determined that ECs and ICs remain effective and continued to be protective of public health and environment. The SVE data collected during monitoring demonstrated that the concentration of tetrachloroethylene (PCE) in the soil vapor has reduced significantly since system start-up in 2013. Groundwater samples were collected on a semi-annual basis, starting in March 2016.

Compliance with the EC/IC Plan is further discussed in Section 2. Compliance with the media monitoring plan is discussed in Section 3 and compliance with the Operation and Maintenance of the ECs is discussed in Section 4. A brief summary and conclusion with recommendations are provided in Section 5.

1.0 BACKGROUND

1.1 Site Description

The Site is located in the Brooklyn, Kings County, New York and is identified as Block 152 and Lots 1001-1006 (formerly Lots 37 and 118) on the current New York City Tax Map (see location in Figure 1). The Site is an approximately 0.46-acre area bounded by Saint Joseph High School (SJHS) and a portion of a 5-story commercial building (Lots 33 and 31, respectively) to the north, a fabric discount store (Lot 6) and ASA Institute of Business (Lot 18) to the south, Bridge Street to the east, and Lawrence Street to the west (see Figure 2). The boundaries of the Site are more fully described in Appendix A - Metes and Bounds.

1.2 Site Development Status

The development on the BCP Site C224134 includes the 53-story residential building with retail spaces on the ground floors and parking from the sub cellar to the 3rd floor of the building. Overall building construction on the Site is complete with some interior retail spaces still under construction. The development footprint is a lot line-to-lot line building as shown in Figure 2.

1.3 Nature and Extent of Contamination

Remedial investigations completed at the Site between May 2008 and July 2008 found several underground storage tanks (UST). A NYSDEC spill number (#0801499) was opened and then subsequently closed on August 18, 2009 after removal of these USTs. Additional remedial investigations on the Site detected soils indicative of urban fill with elevated levels of semi-volatile organic compounds (SVOC) and metals. Also, elevated levels of chlorinated volatile organic compounds (VOC) were detected in groundwater and soil vapor samples. Off-Site remedial investigations were completed to determine potential off-Site impacts from the historic dry cleaning tenant which operated on the Site until 1982. The offsite investigations found elevated levels of chlorinated VOCs from the Site at the adjacent school (SJHS) only.

Of note, a diagnostic testing conducted by FLS in 2015 confirmed that the remaining tetrachloroethene (PCE) contamination in soil vapor beneath the building was primarily present in the area of SVE well 2. A new downsized SVE system was installed in 2016 to more effectively target the area where soil vapor contamination remains.

1.4 Site Remediation

The Site was remediated in accordance with the BCA Index# A2-0623-07-09 for BCP Site C224134 which was executed on August 10, 2009. The BCA was amended on July 13, 2010, to correct the Site size, add a survey map, and add R, K & G Associates, LLC as a Remedial Party.

The Site was remediated in accordance with the NYSDEC-approved Remedial Action Work Plan dated April 2012, which enumerated the following remedial activities:

1. Excavation of soil/fill for development purposes. The soil was screened for indications of contamination (by visual means, odor, and monitoring with a photoionization detector) of all excavated soil during intrusive Site work. All remaining soil met Track 2 RUSCOs;
2. Off-Site disposal of all material removed from the Site in accordance with all Federal, State and local rules and regulations for handling, transport, and disposal;
3. Collection and analysis of end-point samples to evaluate attainment of Track 2 RUSCOs;
4. Installation of a SVE system to remove soil vapor above NYSDOH AGVs, as listed in the NYSDOH *Final Guidance for Evaluating Vapor Intrusion in the State of New York, October 2006*;
5. Installation of an active SSDS as a preventative measure from residual contamination at the Site;
6. Construction and maintenance of an engineered composite cover consisting of a vapor barrier and a concrete pressure slab to prevent human exposure to residual contaminated soil/fill remaining under the Site;
7. Monitoring natural attenuation of groundwater;
8. Installation of an active SSDS, BPS, and sealing of the elevator pit at SJHS, which borders the Site to the north, to address off-Site soil vapor contamination;
9. Development of an SMP for long term management of residual contamination as required by the Environmental Easement, including plans for: (1) ECs /ICs, (2) monitoring, (3) operation and maintenance and (4) reporting.

1.5 Remedy Performance, Effectiveness and Protectiveness

In 2016, after monitoring of PCE concentrations and prior approval of NYSDEC, the 2013 SVE system that included six soil vapor extraction wells was downsized to limit extraction where the bulk of the PCE mass remains (SVE#2). Each of the vapor extraction points, except for one location (SVE#2), were converted into groundwater monitoring wells (SVE-MW-1, SVE-MW-3, SVE-MW 4, SVE-MW-5 and SVE-MW-6) to track monitored attenuations in those areas. Of note, SVE- MW-3 and SVE-MW-6 were abandoned with the prior approval of NYSDEC (dated July 29, 2016) as they were not suitable as groundwater monitoring wells as they did not extend into the groundwater table. Off-Site monitoring wells, MW-3 and MW-7, have been destroyed. Once remediation is completed, extraction well SVE #2 will be converted to a monitoring well and serve as the downgradient well.

The information and data collected during the annual engineering controls inspection are evaluated against the remedial action objectives set forth for the BCP Site.

The annual inspection of the on-Site ECs, which include the SSDS, composite cover system, and SVE system, demonstrated that the ECs continue to perform as designed and continue to be protective of human health and the environment.

Results of the SVE monitoring show a large reduction in the concentrations of chlorinated VOCs in soil vapor since system start-up (Table 2). Results of the groundwater sampling show that natural attenuation of the contaminants is occurring in the subsurface (Table 3). Results of soil vapor and groundwater monitoring are discussed further in Section 3.

The annual inspection of the off-Site ECs, which include the SSDS, BPS, and composite cover system, demonstrated that the off-site ECs also continue to perform as designed and continue to be protective of human health and the environment. The engineering control details and inspection results are discussed in Section 4.

2.0 ENGINEERING AND INSTITUTIONAL CONTROLS PLAN COMPLIANCE

2.1 Institutional Controls

The ICs are non-physical controls, such as Site use restrictions, implemented in order to protect human health and the environment. The SMP requires annual certification of the ICs for the Site to ensure that they continue to be implemented in order to prevent exposure to residual contamination. The ICs for the Site include the SMP, Soils/Materials Management Plan, groundwater use, farming, and gardening restrictions, provisions for deed restrictions and environmental easements, EC/IC plans, and the Operation, Maintenance and Monitoring plan.

2.2 Engineering Controls

The ECs are physical controls employed to contain, stabilize, and monitor residual contamination. Since residual contaminated soil, groundwater, and soil vapor exists beneath the Site, the ECs will continue to remain protecting human health and the environment. The on-Site ECs required by the SMP consist of a SSDS, a SVE system, and a composite cover system. The SSDS will not be operational until the SVE system is fully decommissioned. Of note, the SVE system installed in 2013 was replaced by a new and downsized system in 2016. The currently active SVE system extracts soil vapors from a limited area where the bulk of the PCE mass remains. Groundwater is monitored at the other areas where soil vapor extractions ceased. Off-Site ECs required by the SMP and implemented at SJHS consist of an active SSDS, BPS, and a composite cover system.

The SMP requires an annual inspection and certification of the ECs to ensure that they continue to perform as designed and continue to be protective of human health and the environment.

2.3 Certification of Engineering and Institutional Controls

The owner and the developer parties are responsible for overseeing, documenting, and certifying that the work at the Site was performed by or on behalf of each and done in accordance with the applicable SMP. The annual certifications were performed by Arnold F. Fleming on behalf of 384 Bridge Street, LLC. The completed EC/IC Form for BCP Site C224134 is provided as Appendix B.

3.0 MONITORING PLAN COMPLIANCE

3.1 Groundwater Monitoring

The majority of the existing groundwater monitoring wells were demolished during building construction. According 3.3.1 of the NYSDEC-approved SMP, semi-annual groundwater monitoring will be conducted to confirm natural attenuation of chlorinated VOCs in groundwater. Following the installation of the downsized SVE system in January 2016, five of the six SVE wells were converted to groundwater monitoring wells. Of these five, two wells (SVE-MW-3 and SVE-MW-6) were abandoned in August 2016 as they did not extend into the groundwater table. The SVE and groundwater monitoring well locations are shown on Figure 3.

3.2 Groundwater Monitoring Results

The first round of semi-annual groundwater monitoring was conducted in March 2016, followed by a second round of sampling in September 2016. Groundwater samples collected from the newly converted monitoring wells was analyzed for VOCs and geochemical parameters including nitrate, nitrite, sulfate, ferrous iron, total organic carbon, and dissolved organic carbon.

Both rounds of groundwater results indicate that PCE and trichloroethylene (TCE) are the only compounds detected above the NYSDEC Division of Water Technical and Operational Guidance Series 1.1.1 Ambient Water Quality Standards and Guidance Values (Standards). The decrease in PCE concentrations, compared to the June 2016 results, and the detection of its breakdown products, TCE and cis-1,2-dichloroethene, demonstrate that natural attenuation of chlorinated VOCs continue to occur in groundwater. Table 3 shows the results of the groundwater sample analyses compared to the Standards.

3.3 Soil Vapor Monitoring

The soil vapor monitoring was completed in accordance with the SMP. The objectives of the soil vapor monitoring in conjunction with the SVE system on the Site are to (1) track system performance and (2) monitor for carbon break through. Quarterly sampling of soil vapor was conducted at the system manifold prior to the carbon treatment (influent), after the first carbon treatment unit (midstream), and after the second carbon treatment unit (outlet). Samples are collected with 1-liter summa canisters provided by SGS Accutest Laboratories using 2-hour flow regulators. The soil vapor samples were analyzed for VOCs by EPA Method TO-15.

3.4 Soil Vapor Monitoring Results

The quarterly soil vapor monitoring analytical results (Table 2) were reviewed, and compared to the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2016) for PCE and TCE. The analytical results show that

concentrations of PCE and TCE above the NYSDOH guidance values remain in the soil vapor beneath the building.

The results and findings of the soil vapor sampling of the SVE system, are summarized below:

- The SVE system began operation on June 28, 2013.
- The highest concentrations of PCE (39,700 µg/m^3) and TCE (120 µg/m^3) at the SVE system inlet were recorded on July 3, 2013, after one week of operation.
- After just over one month of SVE operation on August 7, 2013, the concentrations of PCE and TCE at the SVE inlet were 4,710 µg/m^3 and 17 µg/m^3, respectively. This was a reduction in concentrations of PCE by approximately 88% and TCE by approximately 86%.
- Forty two (42) monthly SVE sampling events were completed from June 28, 2013 to October 28, 2015 to monitor performance of SVE system, installed in 2013. The average concentrations of PCE and TCE, at the SVE system inlet, during that span are 6,982 µg/m^3 and 21 µg/m^3, respectively. The maximum concentration of PCE, at the SVE system inlet, during that span was 39,700 µg/m^3 and the minimum concentration was 1510 µg/m^3. The maximum concentration of TCE, at the SVE system inlet, during that span was 120 µg/m^3 and the minimum concentration was 6.4 µg/m^3. No monthly SVE samples were collected during November and December 2015 as the SVE system was running as a passive system to allow the installation of a new SVE system during that time.
- On September 25, 2014, FLS proposed a sampling protocol to evaluate performance of the SVE system and determine if more efficient operation is possible. The proposed sampling protocol involved collection of samples at the SVE inlet but while running the system off one SVE extraction well at a time. The goal of this sampling protocol was to determine which SVE extraction wells are contributing to the persistent PCE and TCE concentrations. FLS implemented this sampling protocol from October 15 to October 22, 2014 after NYSDEC approval and provided results in follow up correspondence.
- On November 11, 2014, FLS provided a written summary of the SVE sampling protocol results. The highest concentrations of PCE and TCE were detected from SVE wells 2 and 4 located in the northeast corner of the Site. The lowest concentrations of PCE and TCE were detected in SVE well 6 located near Lawrence Street on the western side of the Site. Based on the sampling results, the SVE manifold was adjusted to more efficiently target the areas of highest concentrations.
- On April 13, 2015, FLS provided a letter to NSYDEC summarizing the results of the individual well point analysis and made a final manifold adjustment to target contamination near SVE well 2. FLS evaluated the performance of the SVE system with the new manifold arrangement during March, April and May 2015.
- The last sampling event for the former SVE system occurred on October 28, 2015 and detected a concentration of 4,130 µg/m^3 for PCE, at the SVE system inlet. TCE,

at the SVE system inlet, of 20 µg/$m^3$was not detected during the October sampling event.

- On July 27, 2015, FLS provided a summary of the SVE sampling results to NYSDEC and proposed downsizing the size of the SVE system to more appropriately target the remaining contamination near SVE well 2. NYSDEC approved that request in August 2015. The operation of the SVE system was converted to a passive operation during November and December 2015 and the new SVE system began operation on January 15, 2016.
- On January 28, 2016, FLS submitted to NYSDEC the Summary of Soil Vapor Extraction System Installation letter documenting the installation of the new and downsized system and proposing a reduction in vapor and groundwater sampling frequency from monthly to quarterly for vapors, and semi-annual for groundwater. This request was approved by NYSDEC on February 22, 2016.
- Four (4) quarterly events were completed in 2016, after the installation of the new SVE system in January 2016.
- To date, a total of forty seven (47) soil vapor sampling (monthly/quarterly) events have been completed. The most recent samples were collected on December 9, 2016. The SVE inlet readings of PCE and TCE were 275 µg/m^3 and 2.9 µg/m^3, respectively. When comparing to the highest concentrations detected (sample collected July 3, 2013), there is a reduction in concentrations of PCE and TCE of 99.3% and 97.6%, respectively.

4.0 OPERATION AND MAINTENANCE PLAN COMPLIANCE

4.1 Site Inspections

The inspections of the ECs as required by the SMP were coordinated by FLS on a quarterly basis. FLS inspected the on-Site SVE system, the on-Site and off-Site SSDSs, the on-Site and off-Site composite covers, and the off-Site BPS system.

The quarterly inspection reports, which tabulate both SVE system readings and on and off-Site vacuum readings are included as Appendix C. Note that there are two reports from the first quarter in 2016 as a result of receiving NYSDEC's approval for reduction in frequency from monthly to quarterly in February 2016. Site and SVE system photographs are included in Appendix D.

The inspections consisted of the following elements:

- Inspection of the on-Site SVE system, including temperature and pressure readings at the system's components;
- Pressure readings were collected at the SVE extraction wells using digital manometer;
- Inspections of the on-Site and off-Site SSDSs including differential pressure readings using digital manometer at each of the monitoring points;
- Inspection of the BPS at the off-Site property (SJHS);
- Inspections of the composite cover systems, including the conditions of the on-Site and off-Site buildings' foundation slab and sidewalls; and
- Inspections of the basement floor and perimeter for signs of moisture intrusion.

4.2 Inspection Results

The ECs for the Site were inspected and continue to perform as designed, protecting human health and the environment. There are no areas where the composite cover systems appeared impaired, compromised or otherwise damaged.

During the summer, FLS observed that the on-Site SVE system was shut down due to a high-temperature alarm. As explained in the Corrective Measure Report (CMR) sent to NYSDEC on September 23, 2016, FLS noted that the combination of the summer heat and the relocation of the system to the building's exterior were contributing factors to the alarm. The recurring alarms were prevented by adjusting the temperature switch. Aside from these overheating occurrences, the on-Site SVE system functioned properly in 2016. The CMR is provided in Appendix E.

Also, the off-Site SSDS and BPS are functioning normally and no breakdowns or repairs were recorded in 2016. There were no modifications made to the HVAC system at either

the on-Site development building or the off-Site SJHS that would have impacted the SSDSs (or the BPS).

5.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the evaluation of the inspections and monitoring data, FLS concludes the following:

- The EC/ICs were in place and remained effective at the Site in 2016.
- The EC/ICs were in place and remained effective at SJHS off-Site in 2016.
- The operation and maintenance activities were conducted properly.
- The soil vapor sampling of the SVE system was properly implemented. There has been a significant reduction in concentrations of PCE and TCE since SVE system start-up in 2013.
- The groundwater sampling was properly implemented and the PCE concentrations are marginally above the Standard of 5 µg/L.

Based on the evaluation of the inspections and monitoring data, FLS recommends the following:

- All ECs and ICs both at the Site and off-Site will continue in operation and monitoring in 2017.
- The soil vapor sampling of the SVE system will continue to monitor system performance, breakthrough of carbon, and potential for conversion to SSDS operation only.
- Groundwater monitoring will continue to be conducted on a semi-annual basis. These results will evaluate the natural attenuation occurring in the subsurface.

TABLES

Table 1
388 Bridge Street
Responsible Parties

NYSDEC Site #	Development Work	Responsible Party
BCP Site C224134		
	On-Site Building (New Development Building)	384 Bridge Street, LLC
	Off-Site Buiding (Saint Joseph's High School)	384 Bridge Street, LLC

Table 2
BCP No. C224134. 388 Bridge Street, Brooklyn, New York
SVE Sampling Results. June 2013 - December 2016

Compound/ Date	Sampling Frequency	CIS cis-1,2-Dichloroethylene			PCE Tetrachloroethylene			TCE Trichloroethylene		
	NYSDOH Guidance [1]	SVE-INLET	SVE-MIDSTREAM	SVE-OUTLET	SVE-INLET	SVE-MIDSTREAM	SVE-OUTLET	SVE-INLET	SVE-MIDSTREAM	SVE-OUTLET
		-	-	-	**30**	**30**	**30**	**2**	**2**	**2**
6/28/2013	Monthly	25	ND (0.44)	ND (0.44)	29400	1650	124	51	4.3	ND (0.42)
7/3/2013	Monthly	317	17	ND (0.44)	39700	1690	22	120	5.9	1.5
7/10/2013	Monthly	142	ND (0.44)	ND (0.44)	29800	80.7	73.9	73.1	ND (0.42)	ND (0.42)
7/17/2013	Monthly	67.8	4.8	ND (0.44)	8750	486	40	37	4.8	ND (0.42)
7/24/2013	Monthly	ND (0.44)	3.2	ND (0.44)	12	433	45	ND (0.42)	2.2	ND (0.42)
7/31/2013	Monthly	26	ND (0.44)	ND (0.44)	6850	163	31	19	ND (0.42)	ND (0.42)
8/7/2013	Monthly	26	ND (0.44)	ND (0.44)	4710	264	39	17	1.3	ND (0.42)
8/14/2013	Monthly	37	ND (0.44)	ND (0.44)	6750	475	39	30	1.7	ND (0.42)
8/28/2013	Monthly	35	2.6 J	ND (0.44)	5580 E [a]	364	26	22	1.3	ND (0.42)
9/11/2013	Monthly	23	ND (0.44)	NS	4650	321	NS	16	1.2	NS
9/25/2013	Monthly	36	3.4	NS	5440	291	NS	21	1.1	NS
10/9/2013	Monthly	21	3.5	ND (0.44)	3040	232	30	14	ND (0.42)	ND (0.42)
10/23/2013	Monthly	28	9.5	NS	4950	356	NS	18	1.2	NS
11/6/2013	Monthly	25	11	NS	4400	311	NS	17	1.1	NS
11/20/2013	Monthly	23	6.7	ND (0.11)	5280	174	70.5	17	0.64	0.22
12/4/2013	Monthly	17	10	1.9	4140	334	45	14	0.97	ND (0.10)
12/18/2013	Monthly	21	26	5.2	5160	516 E	78.7	20	2.4	0.39
1/2/2014	Monthly	ND (2.2)	13	ND (0.11)	2840	248	18	10	1.6	0.32
1/15/2014	Monthly	26	31	ND (0.44)	7050	1470	62	20	5.3	ND (0.42)
1/29/2014	Monthly	48.8	19	NS	8540	263	NS	19	2.2	NS
2/12/2014	Monthly	32	24	ND (0.11)	8000	664	31	23	4.5	0.42
2/27/2014	Monthly	33 J	16	2.8 J	9900	14	83.4	26	1.9	0.81 J
3/12/2014	Monthly	ND (2.2)	35	6.3	4240	1170	140	11	6.4	0.81
3/26/2014	Monthly	10	21	1.2	1630	156	50	7	0.51	0.81
4/23/2014	Monthly	13	47.2	11	3230	317	48	11	1.4	1
5/20/2014	Monthly	9.9	27	6.3	2530	269	39	7	0.91	ND (0.10)
6/18/2014	Monthly	10	4.4	4.8	1510	41	27	6.4	0.48	0.7
7/23/2014	Monthly	26	30	88.8	5230	466	22	17	3.6	0.35
8/27/2014	Monthly	18	11	35	3860	579	35	13	4	0.44
9/24/2014	Monthly	19	21	23	2960	529	26	28	7.5	0.75
10/15/2014	non-routine	11	NS	NS	1380	NS	NS	7	NS	NS
10/16/2014	non-routine	11	NS	NS	2430	NS	NS	9.1	NS	NS
10/17/2014	non-routine	36	NS	NS	14400	NS	NS	28	NS	NS
10/20/2014	non-routine	5.2	NS	NS	1020	NS	NS	4.8	NS	NS
10/21/2014	non-routine	6.3	NS	NS	1250	NS	NS	4.4	NS	NS

Table 2
BCP No. C224134. 388 Bridge Street, Brooklyn, New York
SVE Sampling Results. June 2013 - December 2016

Compound/ Date	Sampling Frequency	CIS cis-1,2-Dichloroethylene			PCE Tetrachloroethylene			TCE Trichloroethylene		
	NYSDOH Guidance [1]	SVE-INLET	SVE-MIDSTREAM	SVE-OUTLET	SVE-INLET	SVE-MIDSTREAM	SVE-OUTLET	SVE-INLET	SVE-MIDSTREAM	SVE-OUTLET
		-	-	-	**30**	**30**	**30**	**2**	**2**	**2**
10/22/2014	non-routine	2.5	NS	NS	324	NS	NS	1.6	NS	NS
10/29/2014	Monthly	13	11	11	3040	385	18	10	6.4	0.75 J
11/26/2014	Monthly	22	11	9.1	3560	524	22	17	9.7	1.1
12/15/2014	non-routine	19	NS	NS	315	NS	NS	0.81	NS	NS
12/16/2014	non-routine	1.7	NS	NS	202	NS	NS	1.4	NS	NS
12/17/2014	non-routine	15	NS	NS	7730	NS	NS	13	NS	NS
12/18/2014	non-routine	1.5	NS	NS	207	NS	NS	1.6	NS	NS
12/19/2014	non-routine	0.83	NS	NS	142	NS	NS	0.59	NS	NS
12/22/2014	non-routine	ND (0.091)	NS	NS	65	NS	NS	0.4	NS	NS
12/30/2014	Monthly	13	7.9	ND (0.091)	7660	589	1.3	13	8.1	ND (0.16)
1/29/2015	Monthly	18	8.3	5.2	5450	990	38	13	8.1	0.91
2/26/2015	Monthly	17	9.5	4.8	6760	1170	35	14	9.1	1
3/27/2015	Monthly	15	17	6.3	3490	1990	58	13	17	1.3
4/29/2015	Monthly	13	9.9	7.5	5110	834	60	11	9.1	2
5/27/2015	Monthly	13	15	9.5	4060	800	54	9.7	11	1.6
6/23/2015	Monthly	11	11	9.9	4300	530	44	9.7	8.6	1.2
7/30/2015	Monthly	15	20	12	5830	1180	54	12	13	1.4
8/26/2015	Monthly	16	16	13	3490	599	8.8	12	12	1.1
9/23/2015	Monthly	16	15	5.6	6250	1060	28	16	16	1.1
10/28/2015	Monthly	21	11	5.9	4130	759	36	20	12	1.1
*1/26/2016	non-routine	4.4	ND (0.17)	NS	ND (0.31)	ND (0.31)	NS	ND (0.20)	ND (0.20)	NS
3/30/2016	non-routine	16	16	NS	487	16	NS	8.6	10	NS
3/31/2016	Quarterly	NS	NS	ND (0.17)	NS	NS	8.1	NS	NS	15
8/5/2016	Quarterly	66.6	ND (0.17)	ND (0.17)	3410	80	0.81	28	0.52	ND (0.20)
9/20/2016	Quarterly	36 J	9	28	10800	399	5.4 J	31	4.9	ND (2.0)
12/9/2016	Quarterly	5.2	12	26	275	334	6.8	2.9	6.4	ND (2.6)

Notes:

All concentrations measured in ug/m3

Exceedences to NYSDOH Guidance values highlighted in yellow

* A new and downsized system was installed in 2016 with prior approval of NYSDEC

[1] : NYSDOH Guidance for Evaluating Soil Vapor Intrusion

SVE-INLET: Sample collected at the port prior to the carbon treatment

SVE-MIDSTREAM: Sample collected after 1st carbon treatment but before 2nd carbon treatment

SVE-OUTLET: Sample collected after 2nd carbon treatment

Criteria for Termination of SVE Sytem: If the contaminant concentrations in soil vapor become asymptotic to a lower level over an extended period of time, FLS will conclude the SVE system has reached the limit of its effectiveness and request discontinuing operation. The SVE system will remain in place and operational until permission to discontinue use is granted in writing by the NYSDEC.

Table 3
388 Bridge Street
Groundwater Sampling Results

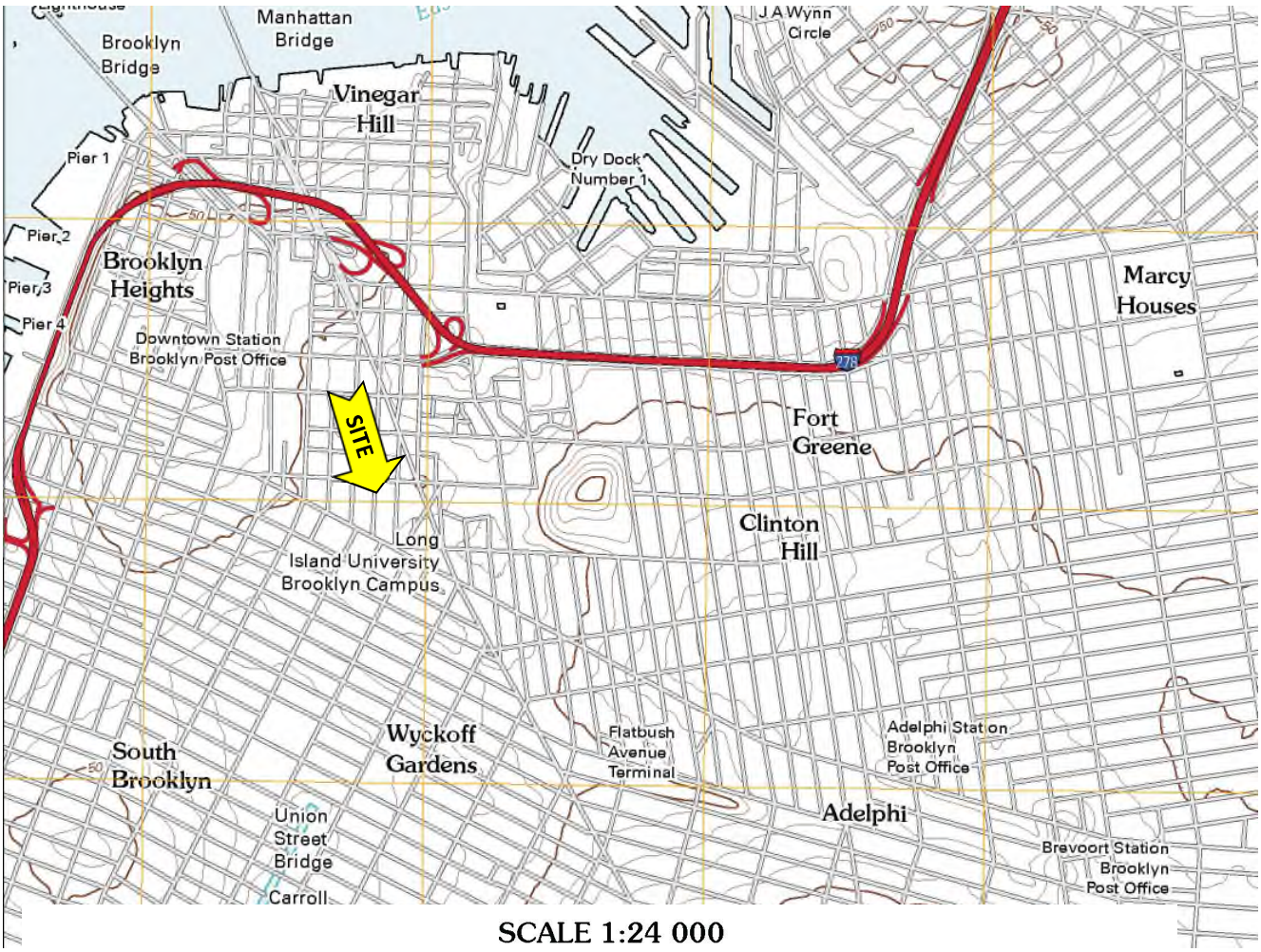
Client Sample ID:	Units	NY TOGS Class GA GW Standards (NYSDEC 6/2004)	SVE-MW-1		SVE-MW-4		SVE-MW-5		TB-20160920
Lab Sample ID:			JC17514-1	JC28127-3	JC17514-2	JC28127-2	JC17514-3	JC28127-1	JC28127-4
Date Sampled:			3/31/2016	9/20/2016	3/31/2016	9/20/2016	3/31/2016	9/20/2016	9/20/2016
Matrix:			Ground Water		Ground Water		Ground Water		Trip Blank Water
GC/MS Volatiles (SW846 8260C)									
Acetone	ug/l	-	ND (3.3)	ND (5.0)	ND (3.3)	ND (5.0)	ND (3.3)	ND (5.0)	ND (5.0)
Benzene	ug/l	1	ND (0.24)	ND (0.14)	ND (0.24)	ND (0.14)	ND (0.24)	ND (0.14)	ND (0.14)
Bromochloromethane	ug/l	5	ND (0.37)	ND (0.46)	ND (0.37)	ND (0.46)	ND (0.37)	ND (0.46)	ND (0.46)
Bromodichloromethane	ug/l	-	ND (0.23)	ND (0.55)	ND (0.23)	ND (0.55)	ND (0.23)	ND (0.55)	ND (0.55)
Bromoform	ug/l	-	ND (0.23)	ND (0.34)	ND (0.23)	ND (0.34)	ND (0.23)	ND (0.34)	ND (0.34)
Bromomethane	ug/l	5	ND (0.42)	ND (0.46)	ND (0.42)	ND (0.46)	ND (0.42)	ND (0.46)	ND (0.46)
2-Butanone (MEK)	ug/l	-	ND (5.6)	ND (1.9)	ND (5.6)	ND (1.9)	ND (5.6)	ND (1.9)	ND (1.9)
Carbon disulfide	ug/l	60	ND (0.25)	ND (0.33)	ND (0.25)	ND (0.33)	ND (0.25)	ND (0.33)	ND (0.33)
Carbon tetrachloride	ug/l	5	ND (0.22)	ND (0.54)	ND (0.22)	ND (0.54)	ND (0.22)	ND (0.54)	ND (0.54)
Chlorobenzene	ug/l	5	ND (0.19)	ND (0.17)	ND (0.19)	ND (0.17)	ND (0.19)	ND (0.17)	ND (0.17)
Chloroethane	ug/l	5	ND (0.34)	ND (0.44)	ND (0.34)	ND (0.44)	ND (0.34)	ND (0.44)	ND (0.44)
Chloroform	ug/l	7	1.7	1	0.89 J	1.3	0.79 J	0.85 J	ND (0.23)
Chloromethane	ug/l	5	ND (0.41)	ND (0.96)	ND (0.41)	ND (0.96)	ND (0.41)	ND (0.96)	ND (0.96)
Cyclohexane	ug/l	-	ND (0.28)	ND (0.73)	ND (0.28)	ND (0.73)	ND (0.28)	ND (0.73)	ND (0.73)
1,2-Dibromo-3-chloropropane	ug/l	0.04	ND (0.99)	ND (0.69)	ND (0.99)	ND (0.69)	ND (0.99)	ND (0.69)	ND (0.69)
Dibromochloromethane	ug/l	-	ND (0.15)	ND (0.23)	ND (0.15)	ND (0.23)	ND (0.15)	ND (0.23)	ND (0.23)
1,2-Dibromoethane	ug/l	0.0006	ND (0.23)	ND (0.22)	ND (0.23)	ND (0.22)	ND (0.23)	ND (0.22)	ND (0.22)
1,2-Dichlorobenzene	ug/l	3	ND (0.19)	ND (0.23)	ND (0.19)	ND (0.23)	ND (0.19)	ND (0.23)	ND (0.23)
1,3-Dichlorobenzene	ug/l	3	ND (0.23)	ND (0.19)	ND (0.23)	ND (0.19)	ND (0.23)	ND (0.19)	ND (0.19)
1,4-Dichlorobenzene	ug/l	3	ND (0.27)	ND (0.21)	ND (0.27)	ND (0.21)	ND (0.27)	ND (0.21)	ND (0.21)
Dichlorodifluoromethane	ug/l	5	ND (0.90)	ND (0.70)	ND (0.90)	ND (0.70)	ND (0.90)	ND (0.70)	ND (0.70)
1,1-Dichloroethane	ug/l	5	ND (0.17)	ND (0.21)	ND (0.17)	ND (0.21)	ND (0.17)	ND (0.21)	ND (0.21)
1,2-Dichloroethane	ug/l	0.6	ND (0.18)	ND (0.39)	ND (0.18)	ND (0.39)	ND (0.18)	ND (0.39)	ND (0.39)
1,1-Dichloroethene	ug/l	5	ND (0.51)	ND (0.20)	ND (0.51)	ND (0.20)	ND (0.51)	ND (0.20)	ND (0.20)
cis-1,2-Dichloroethene	ug/l	5	ND (0.27)	ND (0.31)	0.85 J	1.6	0.34 J	ND (0.31)	ND (0.31)
trans-1,2-Dichloroethene	ug/l	5	ND (0.65)	ND (0.36)	ND (0.65)	ND (0.36)	ND (0.65)	ND (0.36)	ND (0.36)
1,2-Dichloropropane	ug/l	1	ND (0.39)	ND (0.33)	ND (0.39)	ND (0.33)	ND (0.39)	ND (0.33)	ND (0.33)
cis-1,3-Dichloropropene	ug/l	-	ND (0.21)	ND (0.19)	ND (0.21)	ND (0.19)	ND (0.21)	ND (0.19)	ND (0.19)
trans-1,3-Dichloropropene	ug/l	-	ND (0.19)	ND (0.26)	ND (0.19)	ND (0.26)	ND (0.19)	ND (0.26)	ND (0.26)
1,4-Dioxane	ug/l	-	ND (41)	ND (32)	ND (41)	ND (32)	ND (41)	ND (32)	ND (32)
Ethylbenzene	ug/l	5	ND (0.27)	ND (0.20)	ND (0.27)	ND (0.20)	ND (0.27)	ND (0.20)	ND (0.20)
Freon 113	ug/l	5	ND (0.52)	ND (1.2)	ND (0.52)	ND (1.2)	ND (0.52)	ND (1.2)	ND (1.2)
2-Hexanone	ug/l	-	ND (1.7)	ND (1.5)	ND (1.7)	ND (1.5)	ND (1.7)	ND (1.5)	ND (1.5)
Isopropylbenzene	ug/l	5	ND (0.23)	ND (0.16)	ND (0.23)	ND (0.16)	ND (0.23)	ND (0.16)	ND (0.16)
Methyl Acetate	ug/l	-	ND (1.9)	ND (1.5)	ND (1.9)	ND (1.5)	ND (1.9)	ND (1.5)	ND (1.5)
Methylcyclohexane	ug/l	-	ND (0.22)	ND (0.78)	0.31 J	ND (0.78)	ND (0.22)	ND (0.78)	ND (0.78)
Methyl Tert Butyl Ether	ug/l	10	ND (0.24)	ND (0.34)	0.24 J	ND (0.34)	ND (0.24)	ND (0.34)	ND (0.34)
4-Methyl-2-pentanone(MIBK)	ug/l	-	ND (1.0)	ND (1.2)	ND (1.0)	ND (1.2)	ND (1.0)	ND (1.2)	ND (1.2)
Methylene chloride	ug/l	5	ND (0.73)	ND (1.0)	ND (0.73)	ND (1.0)	ND (0.73)	ND (1.0)	ND (1.0)
Styrene	ug/l	5	ND (0.27)	ND (0.27)	ND (0.27)	ND (0.27)	ND (0.27)	ND (0.27)	ND (0.27)
1,1,2,2-Tetrachloroethane	ug/l	5	ND (0.21)	ND (0.39)	ND (0.21)	ND (0.39)	ND (0.21)	ND (0.39)	ND (0.39)
Tetrachloroethene	ug/l	5	**11.9**	**11.8**	**12.5**	**11.9**	**12.1**	**11.3**	ND (0.23)
Toluene	ug/l	5	ND (0.16)	ND (0.23)	ND (0.16)	ND (0.23)	ND (0.16)	ND (0.23)	ND (0.23)
1,2,3-Trichlorobenzene	ug/l	5	ND (0.23)	ND (0.20)	ND (0.23)	ND (0.20)	ND (0.23)	ND (0.20)	ND (0.20)
1,2,4-Trichlorobenzene	ug/l	5	ND (0.21)	ND (0.25)	ND (0.21)	ND (0.25)	ND (0.21)	ND (0.25)	ND (0.25)
1,1,1-Trichloroethane	ug/l	5	ND (0.25)	ND (0.22)	ND (0.25)	ND (0.22)	ND (0.25)	ND (0.22)	ND (0.22)
1,1,2-Trichloroethane	ug/l	1	ND (0.21)	ND (0.28)	ND (0.21)	ND (0.28)	ND (0.21)	ND (0.28)	ND (0.28)
Trichloroethene	ug/l	5	0.49 J	0.40 J	**7.8**	**8.8**	3.3	2.6	ND (0.26)
Trichlorofluoromethane	ug/l	5	ND (0.43)	ND (0.58)	ND (0.43)	ND (0.58)	ND (0.43)	ND (0.58)	ND (0.58)
Vinyl chloride	ug/l	2	ND (0.15)	ND (0.33)	ND (0.15)	ND (0.33)	ND (0.15)	ND (0.33)	ND (0.33)
m,p-Xylene	ug/l	-	ND (0.38)	ND (0.42)	ND (0.38)	ND (0.42)	ND (0.38)	ND (0.42)	ND (0.42)
o-Xylene	ug/l	5	ND (0.17)	ND (0.21)	ND (0.17)	ND (0.21)	ND (0.17)	ND (0.21)	ND (0.21)
Xylene (total)	ug/l	5	ND (0.17)	ND (0.21)	ND (0.17)	ND (0.21)	ND (0.17)	ND (0.21)	ND (0.21)
General Chemistry									
Dissolved Organic Carbon	mg/l	-	-	<1.0	-	<1.0	-	<1.0	-
Iron, Ferrous	mg/l	-	-	<0.20	-	<0.20	-	<0.20	-
Nitrogen, Nitrate	mg/l	10	-	**12.2**	-	6.7	-	9.4	-
Nitrogen, Nitrate + Nitrite	mg/l	10	-	**12.2**	-	6.7	-	9.4	-
Nitrogen, Nitrite	mg/l	1	-	<0.010	-	<0.010	-	<0.010	-
Sulfate	mg/l	250	-	95.7	-	94.4	-	75	-
Total Organic Carbon	mg/l	-	-	<1.0	-	1	-	<1.0	-

Notes:

ND - not detected

J - estimated concentration

FIGURES



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1 0.5 0 1

MILES

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FEET

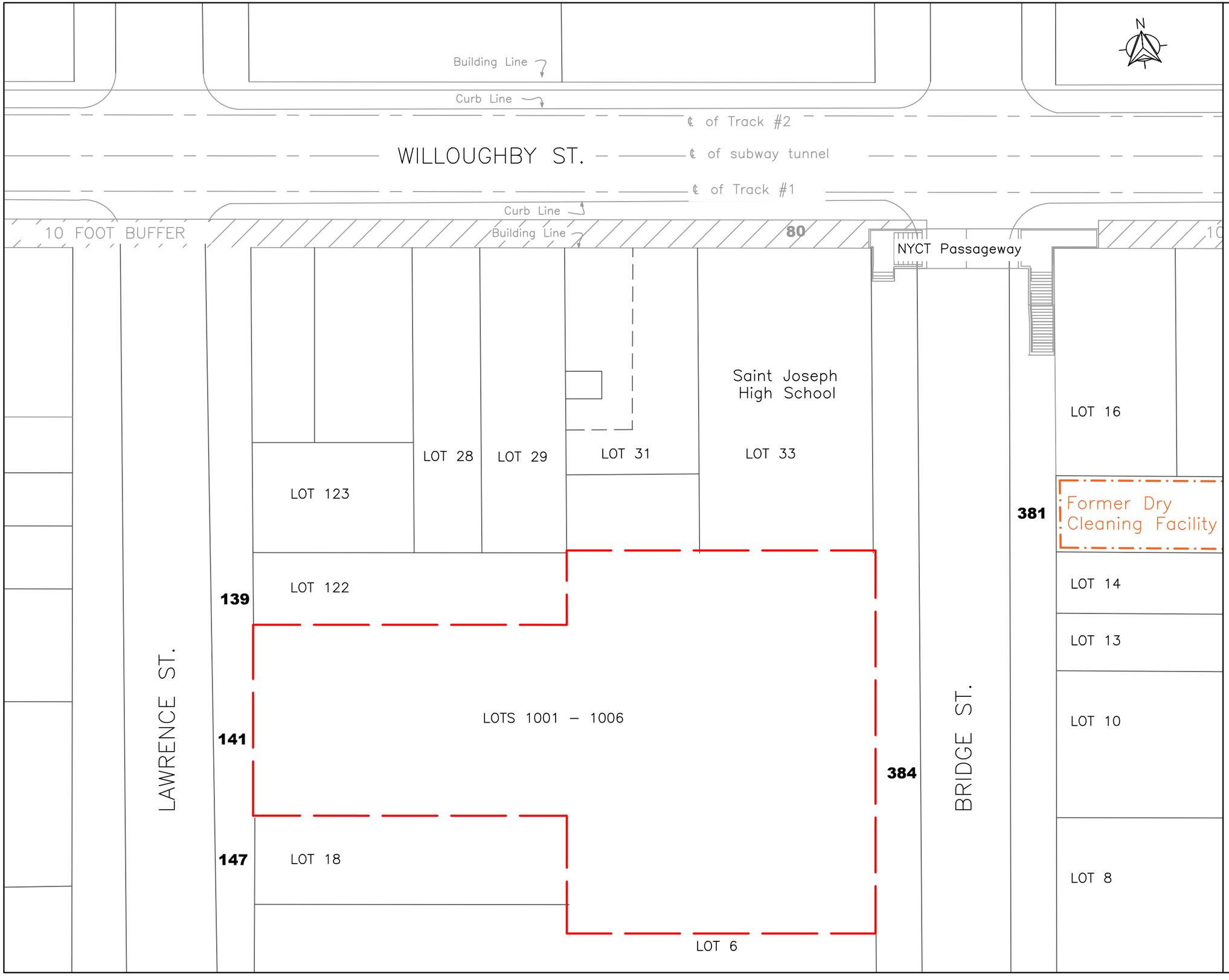
CONTOUR INTERVAL 10 FEET

Site: *Brooklyn Quadrangle, New York 7.5 Minute series USGS Topographic Map (79287)\ Obtained from United States Geological Survey topography compiled 2010*

Fleming Lee Shue

Figure 1: Site Location Map

SITE: 388 Bridge Street
Brooklyn, New York



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Fleming Lee Shue

Environmental Management & Consulting

158 West 29th Street, 9th Fl.
New York, NY 10001

384 Bridge Street
Brooklyn, NY
BCP Site #C224134

Figure 2

Site Plan

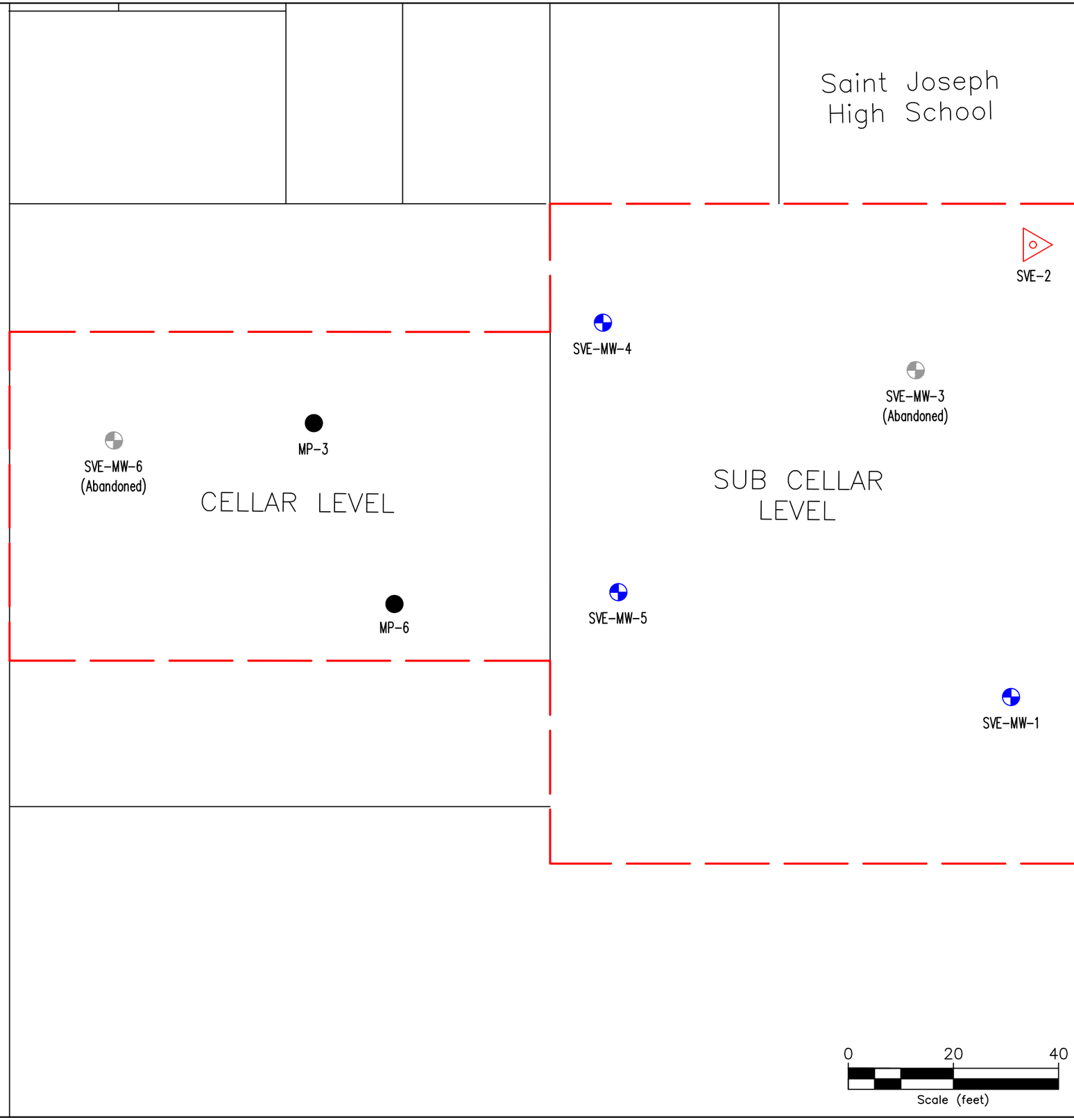
January 2017

Project Number
10149-001

LEGEND

384 Site Address

Site Boundary/
Development Footprint



Bridge St.

Fleming Lee Shue

Environmental Management & Consulting

158 West 29th Street, 9th Fl.
New York, NY 10001

388 Bridge Street
Brookly, NY
BCP Site # C224134

Figure 3

SVE and Groundwater Monitoring Well Locations

January 2017

Project Number
10149-001

LEGEND

- Site Boundary
- Active SVE Well
- Groundwater Monitoring Well
- Vacuum Monitoring Point

FILE: P:\10149 - Stahl Real Estate\001 - 388 Bridge St\Figures\PRR\2016\Figure 3 - SVE and Groundwater Locations.dwg DATE: 1/18/2017

388 Bridge Street
Brooklyn, New York

NYSDEC BCP Site No. C224134

2016 ANNUAL PERIODIC REVIEW REPORT AND ENGINEERING CERTIFICATION

ARNOLD F. FLEMING P.E.

&

Fleming Lee Shue

Environmental Management & Consulting

158 West 29th Street, 9th Floor
New York, NY 10001
(212) 675-3225

FLS Project Number: 10149-001

JANUARY 2017

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EXECUTIVE SUMMARY

This Periodic Review Report (PRR) documents the activities subject to the Site Management Plan (SMP) for 388 Bridge Street (Site) for calendar year 2016. The Site is comprised of Brownfield Cleanup Program (BCP) Site C224134 and administered by the New York State Department of Environmental Conservation (NYSDEC). The engineering and institutional controls (EC/IC) were implemented and were maintained in accordance with the NYSDEC-approved SMP for BCP Site No. C224134 (December 2013).

The purpose of this PRR and Annual Certification is to document on-going Site management activities associated with the permanent ECs and ICs in place at the Site, and to certify that these controls are being maintained in accordance with the Brownfield Cleanup Agreement (BCA).

The Site management activities conducted in 2016 include the following:

- Removal of the on-Site soil vapor extraction (SVE) system installed in 2013 and installation of a new, downsized SVE system;
- Converting five of the six on-Site SVE extraction wells to groundwater monitoring wells;
- Abandoning two of the monitoring wells and beginning the semi-annual groundwater sampling program;
- Routine system inspections of the on-Site SVE system;
- Routine system check of the sub-slab depressurization system (SSDS), a component of the vapor mitigation system implemented at the Site;
- Routine system check of the off-Site ECs including the SSDS and basement pressurization system (BPS), components of the vapor mitigation systems implemented at Saint Joseph's High School (SJHS);
- Visual inspection of the basement floor and perimeter for signs of vapor intrusion;
- Visual inspection of the concrete slab to determine the absence of cracks and fissures.

The implementation of remedial action, Site management activities, and continuous media monitoring were performed by FLS in 2016 under direct supervision of Arnold F. Fleming P.E. It was determined that ECs and ICs remain effective and continued to be protective of public health and environment. The SVE data collected during monitoring demonstrated that the concentration of tetrachloroethylene (PCE) in the soil vapor has reduced significantly since system start-up in 2013. Groundwater samples were collected on a semi-annual basis, starting in March 2016.

Compliance with the EC/IC Plan is further discussed in Section 2. Compliance with the media monitoring plan is discussed in Section 3 and compliance with the Operation and Maintenance of the ECs is discussed in Section 4. A brief summary and conclusion with recommendations are provided in Section 5.

1.0 BACKGROUND

1.1 Site Description

The Site is located in the Brooklyn, Kings County, New York and is identified as Block 152 and Lots 1001-1006 (formerly Lots 37 and 118) on the current New York City Tax Map (see location in Figure 1). The Site is an approximately 0.46-acre area bounded by Saint Joseph High School (SJHS) and a portion of a 5-story commercial building (Lots 33 and 31, respectively) to the north, a fabric discount store (Lot 6) and ASA Institute of Business (Lot 18) to the south, Bridge Street to the east, and Lawrence Street to the west (see Figure 2). The boundaries of the Site are more fully described in Appendix A - Metes and Bounds.

1.2 Site Development Status

The development on the BCP Site C224134 includes the 53-story residential building with retail spaces on the ground floors and parking from the sub cellar to the 3rd floor of the building. Overall building construction on the Site is complete with some interior retail spaces still under construction. The development footprint is a lot line-to-lot line building as shown in Figure 2.

1.3 Nature and Extent of Contamination

Remedial investigations completed at the Site between May 2008 and July 2008 found several underground storage tanks (UST). A NYSDEC spill number (#0801499) was opened and then subsequently closed on August 18, 2009 after removal of these USTs. Additional remedial investigations on the Site detected soils indicative of urban fill with elevated levels of semi-volatile organic compounds (SVOC) and metals. Also, elevated levels of chlorinated volatile organic compounds (VOC) were detected in groundwater and soil vapor samples. Off-Site remedial investigations were completed to determine potential off-Site impacts from the historic dry cleaning tenant which operated on the Site until 1982. The offsite investigations found elevated levels of chlorinated VOCs from the Site at the adjacent school (SJHS) only.

Of note, a diagnostic testing conducted by FLS in 2015 confirmed that the remaining tetrachloroethene (PCE) contamination in soil vapor beneath the building was primarily present in the area of SVE well 2. A new downsized SVE system was installed in 2016 to more effectively target the area where soil vapor contamination remains.

1.4 Site Remediation

The Site was remediated in accordance with the BCA Index# A2-0623-07-09 for BCP Site C224134 which was executed on August 10, 2009. The BCA was amended on July 13, 2010, to correct the Site size, add a survey map, and add R, K & G Associates, LLC as a Remedial Party.

The Site was remediated in accordance with the NYSDEC-approved Remedial Action Work Plan dated April 2012, which enumerated the following remedial activities:

1. Excavation of soil/fill for development purposes. The soil was screened for indications of contamination (by visual means, odor, and monitoring with a photoionization detector) of all excavated soil during intrusive Site work. All remaining soil met Track 2 RUSCOs;
2. Off-Site disposal of all material removed from the Site in accordance with all Federal, State and local rules and regulations for handling, transport, and disposal;
3. Collection and analysis of end-point samples to evaluate attainment of Track 2 RUSCOs;
4. Installation of a SVE system to remove soil vapor above NYSDOH AGVs, as listed in the NYSDOH *Final Guidance for Evaluating Vapor Intrusion in the State of New York, October 2006*;
5. Installation of an active SSDS as a preventative measure from residual contamination at the Site;
6. Construction and maintenance of an engineered composite cover consisting of a vapor barrier and a concrete pressure slab to prevent human exposure to residual contaminated soil/fill remaining under the Site;
7. Monitoring natural attenuation of groundwater;
8. Installation of an active SSDS, BPS, and sealing of the elevator pit at SJHS, which borders the Site to the north, to address off-Site soil vapor contamination;
9. Development of an SMP for long term management of residual contamination as required by the Environmental Easement, including plans for: (1) ECs /ICs, (2) monitoring, (3) operation and maintenance and (4) reporting.

1.5 Remedy Performance, Effectiveness and Protectiveness

In 2016, after monitoring of PCE concentrations and prior approval of NYSDEC, the 2013 SVE system that included six soil vapor extraction wells was downsized to limit extraction where the bulk of the PCE mass remains (SVE#2). Each of the vapor extraction points, except for one location (SVE#2), were converted into groundwater monitoring wells (SVE-MW-1, SVE-MW-3, SVE-MW 4, SVE-MW-5 and SVE-MW-6) to track monitored attenuations in those areas. Of note, SVE- MW-3 and SVE-MW-6 were abandoned with the prior approval of NYSDEC (dated July 29, 2016) as they were not suitable as groundwater monitoring wells as they did not extend into the groundwater table. Off-Site monitoring wells, MW-3 and MW-7, have been destroyed. Once remediation is completed, extraction well SVE #2 will be converted to a monitoring well and serve as the downgradient well.

The information and data collected during the annual engineering controls inspection are evaluated against the remedial action objectives set forth for the BCP Site.

The annual inspection of the on-Site ECs, which include the SSDS, composite cover system, and SVE system, demonstrated that the ECs continue to perform as designed and continue to be protective of human health and the environment.

Results of the SVE monitoring show a large reduction in the concentrations of chlorinated VOCs in soil vapor since system start-up (Table 2). Results of the groundwater sampling show that natural attenuation of the contaminants is occurring in the subsurface (Table 3). Results of soil vapor and groundwater monitoring are discussed further in Section 3.

The annual inspection of the off-Site ECs, which include the SSDS, BPS, and composite cover system, demonstrated that the off-site ECs also continue to perform as designed and continue to be protective of human health and the environment. The engineering control details and inspection results are discussed in Section 4.

2.0 ENGINEERING AND INSTITUTIONAL CONTROLS PLAN COMPLIANCE

2.1 Institutional Controls

The ICs are non-physical controls, such as Site use restrictions, implemented in order to protect human health and the environment. The SMP requires annual certification of the ICs for the Site to ensure that they continue to be implemented in order to prevent exposure to residual contamination. The ICs for the Site include the SMP, Soils/Materials Management Plan, groundwater use, farming, and gardening restrictions, provisions for deed restrictions and environmental easements, EC/IC plans, and the Operation, Maintenance and Monitoring plan.

2.2 Engineering Controls

The ECs are physical controls employed to contain, stabilize, and monitor residual contamination. Since residual contaminated soil, groundwater, and soil vapor exists beneath the Site, the ECs will continue to remain protecting human health and the environment. The on-Site ECs required by the SMP consist of a SSDS, a SVE system, and a composite cover system. The SSDS will not be operational until the SVE system is fully decommissioned. Of note, the SVE system installed in 2013 was replaced by a new and downsized system in 2016. The currently active SVE system extracts soil vapors from a limited area where the bulk of the PCE mass remains. Groundwater is monitored at the other areas where soil vapor extractions ceased. Off-Site ECs required by the SMP and implemented at SJHS consist of an active SSDS, BPS, and a composite cover system.

The SMP requires an annual inspection and certification of the ECs to ensure that they continue to perform as designed and continue to be protective of human health and the environment.

2.3 Certification of Engineering and Institutional Controls

The owner and the developer parties are responsible for overseeing, documenting, and certifying that the work at the Site was performed by or on behalf of each and done in accordance with the applicable SMP. The annual certifications were performed by Arnold F. Fleming on behalf of 384 Bridge Street, LLC. The completed EC/IC Form for BCP Site C224134 is provided as Appendix B.

3.0 MONITORING PLAN COMPLIANCE

3.1 Groundwater Monitoring

The majority of the existing groundwater monitoring wells were demolished during building construction. According 3.3.1 of the NYSDEC-approved SMP, semi-annual groundwater monitoring will be conducted to confirm natural attenuation of chlorinated VOCs in groundwater. Following the installation of the downsized SVE system in January 2016, five of the six SVE wells were converted to groundwater monitoring wells. Of these five, two wells (SVE-MW-3 and SVE-MW-6) were abandoned in August 2016 as they did not extend into the groundwater table. The SVE and groundwater monitoring well locations are shown on Figure 3.

3.2 Groundwater Monitoring Results

The first round of semi-annual groundwater monitoring was conducted in March 2016, followed by a second round of sampling in September 2016. Groundwater samples collected from the newly converted monitoring wells was analyzed for VOCs and geochemical parameters including nitrate, nitrite, sulfate, ferrous iron, total organic carbon, and dissolved organic carbon.

Both rounds of groundwater results indicate that PCE and trichloroethylene (TCE) are the only compounds detected above the NYSDEC Division of Water Technical and Operational Guidance Series 1.1.1 Ambient Water Quality Standards and Guidance Values (Standards). The decrease in PCE concentrations, compared to the June 2016 results, and the detection of its breakdown products, TCE and cis-1,2-dichloroethene, demonstrate that natural attenuation of chlorinated VOCs continue to occur in groundwater. Table 3 shows the results of the groundwater sample analyses compared to the Standards.

3.3 Soil Vapor Monitoring

The soil vapor monitoring was completed in accordance with the SMP. The objectives of the soil vapor monitoring in conjunction with the SVE system on the Site are to (1) track system performance and (2) monitor for carbon break through. Quarterly sampling of soil vapor was conducted at the system manifold prior to the carbon treatment (influent), after the first carbon treatment unit (midstream), and after the second carbon treatment unit (outlet). Samples are collected with 1-liter summa canisters provided by SGS Accutest Laboratories using 2-hour flow regulators. The soil vapor samples were analyzed for VOCs by EPA Method TO-15.

3.4 Soil Vapor Monitoring Results

The quarterly soil vapor monitoring analytical results (Table 2) were reviewed, and compared to the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2016) for PCE and TCE. The analytical results show that

concentrations of PCE and TCE above the NYSDOH guidance values remain in the soil vapor beneath the building.

The results and findings of the soil vapor sampling of the SVE system, are summarized below:

- The SVE system began operation on June 28, 2013.
- The highest concentrations of PCE (39,700 µg/m^3) and TCE (120 µg/m^3) at the SVE system inlet were recorded on July 3, 2013, after one week of operation.
- After just over one month of SVE operation on August 7, 2013, the concentrations of PCE and TCE at the SVE inlet were 4,710 µg/m^3 and 17 µg/m^3, respectively. This was a reduction in concentrations of PCE by approximately 88% and TCE by approximately 86%.
- Forty two (42) monthly SVE sampling events were completed from June 28, 2013 to October 28, 2015 to monitor performance of SVE system, installed in 2013. The average concentrations of PCE and TCE, at the SVE system inlet, during that span are 6,982 µg/m^3 and 21 µg/m^3, respectively. The maximum concentration of PCE, at the SVE system inlet, during that span was 39,700 µg/m^3 and the minimum concentration was 1510 µg/m^3. The maximum concentration of TCE, at the SVE system inlet, during that span was 120 µg/m^3 and the minimum concentration was 6.4 µg/m^3. No monthly SVE samples were collected during November and December 2015 as the SVE system was running as a passive system to allow the installation of a new SVE system during that time.
- On September 25, 2014, FLS proposed a sampling protocol to evaluate performance of the SVE system and determine if more efficient operation is possible. The proposed sampling protocol involved collection of samples at the SVE inlet but while running the system off one SVE extraction well at a time. The goal of this sampling protocol was to determine which SVE extraction wells are contributing to the persistent PCE and TCE concentrations. FLS implemented this sampling protocol from October 15 to October 22, 2014 after NYSDEC approval and provided results in follow up correspondence.
- On November 11, 2014, FLS provided a written summary of the SVE sampling protocol results. The highest concentrations of PCE and TCE were detected from SVE wells 2 and 4 located in the northeast corner of the Site. The lowest concentrations of PCE and TCE were detected in SVE well 6 located near Lawrence Street on the western side of the Site. Based on the sampling results, the SVE manifold was adjusted to more efficiently target the areas of highest concentrations.
- On April 13, 2015, FLS provided a letter to NSYDEC summarizing the results of the individual well point analysis and made a final manifold adjustment to target contamination near SVE well 2. FLS evaluated the performance of the SVE system with the new manifold arrangement during March, April and May 2015.
- The last sampling event for the former SVE system occurred on October 28, 2015 and detected a concentration of 4,130 µg/m^3 for PCE, at the SVE system inlet. TCE,

at the SVE system inlet, of 20 µg/$m^3$was not detected during the October sampling event.

- On July 27, 2015, FLS provided a summary of the SVE sampling results to NYSDEC and proposed downsizing the size of the SVE system to more appropriately target the remaining contamination near SVE well 2. NYSDEC approved that request in August 2015. The operation of the SVE system was converted to a passive operation during November and December 2015 and the new SVE system began operation on January 15, 2016.
- On January 28, 2016, FLS submitted to NYSDEC the Summary of Soil Vapor Extraction System Installation letter documenting the installation of the new and downsized system and proposing a reduction in vapor and groundwater sampling frequency from monthly to quarterly for vapors, and semi-annual for groundwater. This request was approved by NYSDEC on February 22, 2016.
- Four (4) quarterly events were completed in 2016, after the installation of the new SVE system in January 2016.
- To date, a total of forty seven (47) soil vapor sampling (monthly/quarterly) events have been completed. The most recent samples were collected on December 9, 2016. The SVE inlet readings of PCE and TCE were 275 µg/m^3 and 2.9 µg/m^3, respectively. When comparing to the highest concentrations detected (sample collected July 3, 2013), there is a reduction in concentrations of PCE and TCE of 99.3% and 97.6%, respectively.

4.0 OPERATION AND MAINTENANCE PLAN COMPLIANCE

4.1 Site Inspections

The inspections of the ECs as required by the SMP were coordinated by FLS on a quarterly basis. FLS inspected the on-Site SVE system, the on-Site and off-Site SSDSs, the on-Site and off-Site composite covers, and the off-Site BPS system.

The quarterly inspection reports, which tabulate both SVE system readings and on and off-Site vacuum readings are included as Appendix C. Note that there are two reports from the first quarter in 2016 as a result of receiving NYSDEC's approval for reduction in frequency from monthly to quarterly in February 2016. Site and SVE system photographs are included in Appendix D.

The inspections consisted of the following elements:

- Inspection of the on-Site SVE system, including temperature and pressure readings at the system's components;
- Pressure readings were collected at the SVE extraction wells using digital manometer;
- Inspections of the on-Site and off-Site SSDSs including differential pressure readings using digital manometer at each of the monitoring points;
- Inspection of the BPS at the off-Site property (SJHS);
- Inspections of the composite cover systems, including the conditions of the on-Site and off-Site buildings' foundation slab and sidewalls; and
- Inspections of the basement floor and perimeter for signs of moisture intrusion.

4.2 Inspection Results

The ECs for the Site were inspected and continue to perform as designed, protecting human health and the environment. There are no areas where the composite cover systems appeared impaired, compromised or otherwise damaged.

During the summer, FLS observed that the on-Site SVE system was shut down due to a high-temperature alarm. As explained in the Corrective Measure Report (CMR) sent to NYSDEC on September 23, 2016, FLS noted that the combination of the summer heat and the relocation of the system to the building's exterior were contributing factors to the alarm. The recurring alarms were prevented by adjusting the temperature switch. Aside from these overheating occurrences, the on-Site SVE system functioned properly in 2016. The CMR is provided in Appendix E.

Also, the off-Site SSDS and BPS are functioning normally and no breakdowns or repairs were recorded in 2016. There were no modifications made to the HVAC system at either

the on-Site development building or the off-Site SJHS that would have impacted the SSDSs (or the BPS).

5.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the evaluation of the inspections and monitoring data, FLS concludes the following:

- The EC/ICs were in place and remained effective at the Site in 2016.
- The EC/ICs were in place and remained effective at SJHS off-Site in 2016.
- The operation and maintenance activities were conducted properly.
- The soil vapor sampling of the SVE system was properly implemented. There has been a significant reduction in concentrations of PCE and TCE since SVE system start-up in 2013.
- The groundwater sampling was properly implemented and the PCE concentrations are marginally above the Standard of 5 µg/L.

Based on the evaluation of the inspections and monitoring data, FLS recommends the following:

- All ECs and ICs both at the Site and off-Site will continue in operation and monitoring in 2017.
- The soil vapor sampling of the SVE system will continue to monitor system performance, breakthrough of carbon, and potential for conversion to SSDS operation only.
- Groundwater monitoring will continue to be conducted on a semi-annual basis. These results will evaluate the natural attenuation occurring in the subsurface.

APPENDIX A

Metes and Bounds

SCHEDULE "A"
ENVIRONMENTAL EASEMENT
PROPERTY DESCRIPTION

The Condominium (in the Building located at and known as The Bridge Street Condominium and by Street Number 384-394 Bridge Street, New York), designated and described as Units Parking, Commercial 1, Commercial 2, Lower 80/20, Upper 80/20 and Divisible (hereinafter called the "Unit") in the Declaration (hereinafter called "Declaration") made by the Sponsor under the Condominium Act of The State of New York (Article 9-B of the Real Property Law of the State of New York), dated March 21, 2012 and recorded June 14, 2012 in the Office of the Register, the City of New York, County of New York, in CRFN 2012000231607 establishing a plan for Condominium ownership of said Building and the land upon which the same is erected (hereinafter sometimes collectively called the "Property") and also designated and described as Tax Lot Nos. 1001-1006 Block 152, Borough of Brooklyn, on the Tax Map of the Real Property Assessment Department of the City of New York and on the Floor Plans of said Building certified by Professional Engineer, on and filed as Condominium Plan No. 3222 on June 14, 2012 in the aforesaid Register's Office.

Together with an undivided 100 percent interest in the common elements of the property described in the Declaration.

The land upon which the Building containing the Unit is erected as follows:

Legal Description of Environmental Easement Area (former Lots 37 & 118 Block 152 Joined as one)

“Being the same piece or parcel of Land conveyed to R, K, & G Associates from 1929 Realty, Inc., by deed dated June 15, 1977 recorded in Reel 926 Page 725 and also the same parcel of land conveyed to 384 Bridge Street LLC from 141 Lawrence Street LLC, by deed dated December 19, 2011 recorded as CRFN: 2012000020329 in the Office of City Register of the City of New York.”

ALL that certain plot, piece or parcel of land, situate, lying and being in the Borough of Brooklyn, County of Kings, City and State of New York, bounded and described as follows:

BEGINNING at a point on the Westerly side of Bridge Street distant 100 feet southerly from the corner formed by the intersection of the Westerly side of Bridge Street and the Southerly side of Willoughby Street;

RUNNING THENCE Westerly parallel with Willoughby Street 107 feet 6 inches;

THENCE Southerly parallel with Bridge Street 25.0 feet;

THENCE Westerly parallel with Willoughby Street I07 feet 6 inches to the Easterly side of Lawrence Street;

THENCE Southerly along the easterly side of Lawrence Street 62 feet;

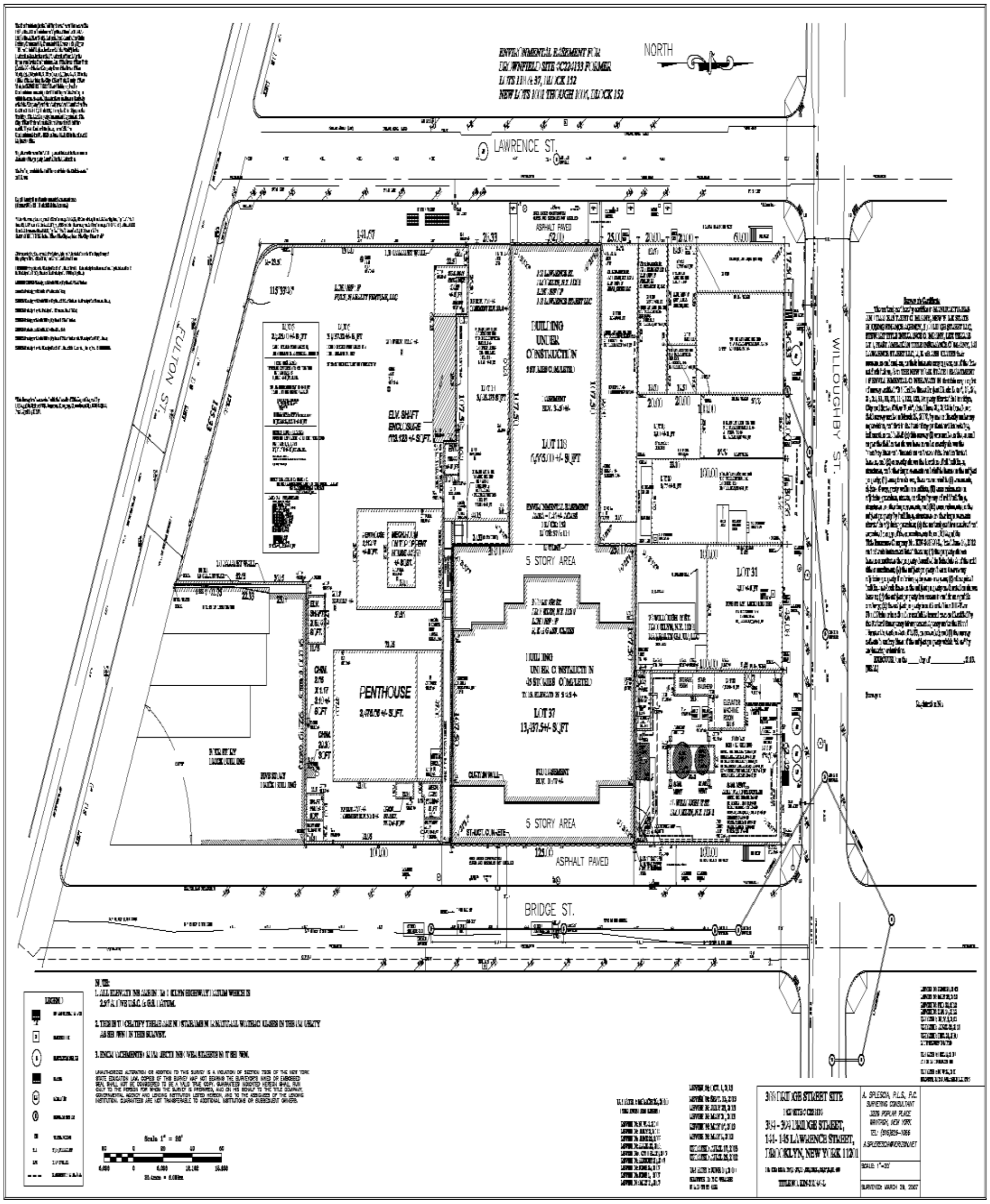
THENCE Easterly parallel with Willoughby Street 107 feet 6 inches;

THENCE Southerly parallel with Bridge Street 38.0 feet;

THENCE Easterly parallel with Willoughby Street 107 feet 6 inches to the Westerly side of Bridge Street;

THENCE Northerly along the Westerly side of Bridge Street 125.0 feet to the point or place of BEGINNING.

SURVEY


NORTH
LAWRENCE ST.
FULTON ST.
WILLOUGHBY ST.
BRIDGE ST.
ASPHALT PAVED
5 STORY AREA
PENTHOUSE
LOT 37
LOT 31
LOT 118

APPENDIX B

Engineering Controls / Institutional Controls Certifications

APPENDIX C

Quarterly Inspection Reports

388 Bridge Street
SVE OMM and Pressure Readings

Date 1/26/2016 **Amb. Air Temp. (°F)** 43

Process Area	Indicator ID	Paramenter	Unit	Reading/ Status	Time
System Inlet	SP 100	Pressure (man.)	inwc	N/A	---
		Flow	cfm	N/A	---
		Temp.	°F	N/A	---
		Rel. Humidity	%	N/A	---
	VI 101	Pressure	inwc	-24	11:15
Post- Moist. Separator /	VI 102	Pressure	inwc	---	---
Pre- Blower	F-102	Dilution Valve	---	Closed	11:15
Pre- Blower /	PI 101	Pressure	inwc	---	---
Before Heat Exchanger	TI 101	Temp.	°F	---	---
After heat exchanger /	PI 103	Pressure	inwc	13	11:15
Pre- Carbon Treatment	TI 102	Temp.	°F	---	---
Between Carbon Units	PI 104	Pressure	inwc	5	11:15
Post- Carbon Treatment	PI 105	Pressure	inwc	N/A	---

Monitoring Point	Pressure (in. wc.)	Location	Comments
SVE Well #1	-0.719	Sub-cellar garage	
SVE Well #2	-1.5	Sub-cellar garage	
SVE Well #3	---	Sub-cellar garage	Quick-connect inoperable
SVE Well #4	-2.3	Sub-cellar garage	
SVE Well #5	-2.3	Sub-cellar garage	
SVE Well #6	---	Cellar workshop	Inaccessible
SSDS MP #1	---	Not installed	
SSDS MP #2	---	Not installed	
SSDS MP #3	0.016	Cellar hallway	
SSDS MP #4	---	Not installed	
SSDS MP #5	---	Not installed	
SSDS MP #6	---	Cellar garage	Inaccessible

Monitoring Point	Pressure (in. wc.)	Port Location	Comments
R1	---	Behind Boiler Room	locked
R2	---	Boiler Room	covered by closet
R3	-0.089	Boiler Room	
R4	-0.034	Boiler Room	
R5	---	Workshop	Super's office locked
R6	---	Back Storage Room	locked
R7	---	Storage Room hallway	locked
R8	-0.081	Storage Room entrance	
R9	---	Cafeteria area	beneath floor
R10	---	East Storage room	inaccesible
R11	---	East Storage room	inaccesible
R12	---	Stairwell	locked
R13	-1.861	Kitchen storage	

Sample ID	Flow Controller No.	Canister No.	Initial Time	Final Time	Initial/Final Vacuum
SVE inlet	FC385	A1254	11:33	13:28	27.5 / 0.5
SVE midstream	FC330	A1252	11:34	13:28	29 / 2
SVE outlet	---	---	---	---	---

Notes
4 gallons of water removed from SJHS SSDS
Unable to collect SVE-Outlet as no sampling port has been installed

388 Bridge Street
SVE OMM and Pressure Readings

Date 3/30/2016 **Amb. Air Temp. (°F)** 46

Process Area	Indicator ID	Paramenter	Unit	Reading/ Status	Time
System Inlet	SP 100	Pressure (man.)	inwc	---	---
		Flow	cfm	---	---
		Temp.	°F	---	---
		Rel. Humidity	%	---	---
	VI 101	Pressure	inwc	-26	10:30
Post- Moist. Separator /	VI 102	Pressure	inwc	-50	10:30
Pre- Blower	F-102	Dilution Valve	---	Closed	10:30
Pre- Blower /	PI 101	Pressure	inwc	26	10:30
Before Heat Exchanger	TI 101	Temp.	°F	120	10:30
After heat exchanger /	PI 103	Pressure	inwc	2	10:30
Pre- Carbon Treatment	TI 102	Temp.	°F	108	10:30
Between Carbon Units	PI 104	Pressure	inwc	---	----
Post- Carbon Treatment	PI 105	Pressure	inwc	N/A	---

Monitoring Point	Pressure (in. wc.)	Location	Comments
SVE Well #1	-0.112	Sub-cellar garage	
SVE Well #2	---	Sub-cellar garage	Quick-connect inoperable
SVE Well #3	---	Sub-cellar garage	Quick-connect inoperable
SVE Well #4	-0.150	Sub-cellar garage	
SVE Well #5	-0.165	Sub-cellar garage	
SVE Well #6	-0.121	Cellar workshop	
SSDS MP #1	---	Not installed	
SSDS MP #2	---	Not installed	
SSDS MP #3	0.037	Cellar hallway	
SSDS MP #4	---	Not installed	
SSDS MP #5	---	Not installed	
SSDS MP #6	-0.012	Cellar garage	

Monitoring Point	Pressure (in. wc.)	Port Location	Comments
R1	---	Behind Boiler Room	locked
R2	---	Boiler Room	covered by closet
R3	-0.201	Boiler Room	
R4	-0.088	Boiler Room	
R5	-0.019	Workshop	
R6	---	Back Storage Room	locked
R7	-0.037	Storage Room hallway	
R8	-0.131	Storage Room entrance	
R9	---	Cafeteria area	beneath floor
R10	---	East Storage room	inaccesible
R11	---	East Storage room	inaccesible
R12	---	Stairwell	locked
R13	-0.289	Kitchen storage	

Sample ID	Flow Controller No.	Canister No.	Initial Time	Final Time	Initial/Final Vacuum
SVE inlet	FC490	A437	10:32	12:28	29 / 4
SVE midstream	FC386	M333	10:32	12:29	28 / 5
SVE outlet	FC 368	A59	10:02	12:02	29 / 5

Notes
Developed wells 1, 4, and 5
On-site system and SJHS pressure readings collected on 3/31/2016
SVE outlet collected on 3/31/2016, following sample port installation

388 Bridge Street
SVE OMM and Pressure Readings

Date 8/5/2016 **Amb. Air Temp. (°F)** 81

Process Area	Indicator ID	Paramenter	Unit	Reading/ Status	Time
System Inlet	SP 100	Pressure (man.)	inwc	20.2	12:07
		Air speed	fpm	---	---
		Flow	cfm	---	---
		Temp.	°F	---	---
	VI 101	Pressure	inwc	23	12:07
Post- Moist. Separator /	VI 102	Pressure	inwc	12	12:07
Pre- Blower	F-102	Dilution Valve	---	closed	12:07
Pre- Blower /	PI 101	Pressure	inwc	26	12:07
Before Heat Exchanger	TI 101	Temp.	°F	140	12:07
After heat exchanger /	PI 103	Pressure	inwc	10	12:07
Pre- Carbon Treatment	TI 102	Temp.	°F	126	12:07
Between Carbon Units	PI 104	Pressure	inwc	4	12:07
Post- Carbon Treatment	PI 105	Pressure	inwc	1.3	12:07

Monitoring Point	Pressure (in. wc.)	Location	Comments
SVE Well #1	---	Sub-cellar garage	Converted to monitoring well
SVE Well #2	-9	Sub-cellar garage	
SVE Well #3	---	Sub-cellar garage	Abandoned
SVE Well #4	---	Sub-cellar garage	Converted to monitoring well
SVE Well #5	---	Sub-cellar garage	Converted to monitoring well
SVE Well #6	---	Cellar workshop	Abandoned
SSDS MP #1	---	Not installed	
SSDS MP #2	---	Not installed	
SSDS MP #3	0.016	Cellar hallway	
SSDS MP #4	---	Not installed	
SSDS MP #5	---	Not installed	
SSDS MP #6	0.006	Cellar garage	

Monitoring Point	Pressure (in. wc.)	Port Location	Comments
R1	---	Behind Boiler Room	locked
R2	---	Boiler Room	covered by closet
R3	-0.012	Boiler Room	
R4	-0.008	Boiler Room	
R5	-0.004	Workshop	
R6	---	Back Storage Room	locked
R7	---	Storage Room hallway	
R8	-0.182	Storage Room entrance	
R9	---	Cafeteria area	beneath floor
R10	---	East Storage room	inaccesible
R11	---	East Storage room	inaccesible
R12	---	Stairwell	locked
R13	-0.307	Kitchen storage	

Sample ID	Flow Controller No.	Canister No.	Initial Time	Final Time	Initial/Final Vacuum
SVE inlet	FC420	A1251	11:32	13:02	27 / 5
SVE midstream	FC234	A1237	11:32	11:50	5 / 3
SVE outlet	FC481	A1254	11:32	13:22	29 / 6

Notes
Installed a new temperature switch
Samples not collect in June due to a high temperature alarm

388 Bridge Street
SVE OMM and Pressure Readings

Date 9/20/2016 **Amb. Air Temp. (°F)** 73

Process Area	Indicator ID	Paramenter	Unit	Reading/ Status	Time
System Inlet	SP 100	Pressure (man.)	inwc	---	---
		Air speed	fpm	---	---
		Flow	cfm	---	---
		Temp.	°F	---	---
	VI 101	Pressure	inwc	24	9:34
Post- Moist. Separator /	VI 102	Pressure	inwc	52	9:34
Pre- Blower	F-102	Dilution Valve	---	closed	9:34
Pre- Blower /	PI 101	Pressure	inwc	26	9:34
Before Heat Exchanger	TI 101	Temp.	°F	138	9:34
After heat exchanger /	PI 103	Pressure	inwc	10	9:34
Pre- Carbon Treatment	TI 102	Temp.	°F	122	9:34
Between Carbon Units	PI 104	Pressure	inwc	4	9:34
Post- Carbon Treatment	PI 105	Pressure	inwc	1.5	9:34

Monitoring Point	Pressure (in. wc.)	Location	Comments
SVE Well #1	---	Sub-cellar garage	Converted to monitoring well
SVE Well #2	-9.3	Sub-cellar garage	
SVE Well #3	---	Sub-cellar garage	Abandoned
SVE Well #4	---	Sub-cellar garage	Converted to monitoring well
SVE Well #5	---	Sub-cellar garage	Converted to monitoring well
SVE Well #6	---	Cellar workshop	Abandoned
SSDS MP #1	---	Not installed	
SSDS MP #2	---	Not installed	
SSDS MP #3	0.025	Cellar hallway	
SSDS MP #4	---	Not installed	
SSDS MP #5	---	Not installed	
SSDS MP #6	-0.004	Cellar garage	

Monitoring Point	Pressure (in. wc.)	Port Location	Comments
R1	---	Behind Boiler Room	locked
R2	---	Boiler Room	covered by closet
R3	0.008	Boiler Room	
R4	0.007	Boiler Room	
R5	---	Workshop	Super's office locked
R6	---	Back Storage Room	locked
R7	-0.014	Storage Room hallway	
R8	-0.181	Storage Room entrance	
R9	---	Cafeteria area	beneath floor
R10	---	East Storage room	inaccesible
R11	---	East Storage room	inaccesible
R12	---	Stairwell	locked
R13	-1.052	Kitchen storage	

Sample ID	Flow Controller No.	Canister No.	Initial Time	Final Time	Initial/Final Vacuum
SVE inlet	FC372	A693	9:51	11:35	30 / 5
SVE midstream	FC224	A1142	9:51	11:40	30 / 5
SVE outlet	FC566	A590	9:51	11:51	29 / 5

Notes
System remained in operation, will keep temperature switch set at 130 F

388 Bridge Street
SVE OMM and Pressure Readings

Date 12/9/2016 **Amb. Air Temp. (°F)** 38

Process Area	Indicator ID	Paramenter	Unit	Reading/ Status	Time
System Inlet	SP 100	Pressure (man.)	inwc	---	---
		Air speed	fpm	---	---
		Flow	cfm	---	---
		Temp.	°F	---	---
	VI 101	Pressure	inwc	32	11:40
Post- Moist. Separator /	VI 102	Pressure	inwc	46	11:40
Pre- Blower	F-102	Dilution Valve	---	closed	11:40
Pre- Blower /	PI 101	Pressure	inwc	28	11:40
Before Heat Exchanger	TI 101	Temp.	°F	110	11:40
After heat exchanger /	PI 103	Pressure	inwc	12	11:40
Pre- Carbon Treatment	TI 102	Temp.	°F	90	11:40
Between Carbon Units	PI 104	Pressure	inwc	6	11:40
Post- Carbon Treatment	PI 105	Pressure	inwc	0	11:40

Monitoring Point	Pressure (in. wc.)	Location	Comments
SVE Well #1	---	Sub-cellar garage	Converted to monitoring well
SVE Well #2	-7.4	Sub-cellar garage	
SVE Well #3	---	Sub-cellar garage	Abandoned
SVE Well #4	---	Sub-cellar garage	Converted to monitoring well
SVE Well #5	---	Sub-cellar garage	Converted to monitoring well
SVE Well #6	---	Cellar workshop	Abandoned
SSDS MP #1	---	Not installed	
SSDS MP #2	---	Not installed	
SSDS MP #3	0.101	Cellar hallway	
SSDS MP #4	---	Not installed	
SSDS MP #5	---	Not installed	
SSDS MP #6	-0.007	Cellar garage	

Monitoring Point	Pressure (in. wc.)	Port Location	Comments
R1	---	Behind Boiler Room	locked
R2	---	Boiler Room	covered by closet
R3	-0.007	Boiler Room	
R4	-0.006	Boiler Room	
R5	-0.013	Workshop	
R6	---	Back Storage Room	locked
R7	-0.004	Storage Room hallway	
R8	-0.013	Storage Room entrance	
R9	---	Cafeteria area	beneath floor
R10	---	East Storage room	inaccesible
R11	---	East Storage room	inaccesible
R12	---	Stairwell	locked
R13	-0.1693	Kitchen storage	

Sample ID	Flow Controller No.	Canister No.	Initial Time	Final Time	Initial/Final Vacuum
SVE inlet	FC391	M177	11:46	13:52	29.5 / 0
SVE midstream	FC430	A605	11:46	13:52	29 / 3
SVE outlet	FC099	A1149	9:40	11:40	30 / 6

Notes
Due to a can malfunction, SVE outlet was collected on 12/13/2016

APPENDIX D

Site Photographs

Site Photographs

Photo1: View of the building facing north with Bridge Street

Photo 2: View Saint Joseph High School facing north with Bridge Street

Photo 3: SVE system carbon drums

Photo 4: New SVE system (front)

Photo 5: SVE inlet and moisture separator

Photo 6: SVE system manifold

Photo 7: Groundwater monitoring well

Photo 8: SSDS monitoring point

APPENDIX E

Corrective Measures Reports

Fleming Lee Shue

Environmental Management & Consulting

September 23, 2016

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

RE: Corrective Measures Report
388 Bridge Street Site – Brooklyn, New York
BCP Site #C224134

Dear Mr. MacCabe:

Fleming-Lee Shue, Inc. (FLS) has prepared this letter to update you on the status of the soil vapor extraction (SVE) system operating at 388 Bridge Street (Site), and is a follow-up on the 7/1/2016 email informing you that the system has experienced shutdowns triggered by high-temperature alarms. Figure 1 presents the SVE system's process and instrumentation diagram (P&ID) which provides a schematic of the equipment, pipe, gauge, and alarm locations.

Background

On June 24, 2016, FLS went to the Site to collect quarterly soil vapor samples at the SVE system. Upon arrival, it was noted that the system shut down because of a blower high discharge temperature alarm triggered by the temperature switch (TSH 101, see P&ID) located immediately before the primary carbon vessel. This alarm's function is to prevent the soil vapor from reaching a temperature that would adversely affect the system's hoses and carbon vessels. FLS noted that the combination of the summer heat and the relocation of the system to the building's exterior were contributing factors to the alarm.

At the time of the alarm, the temperature switch was set to shut the system off if the soil vapor exceeds 130°F. In an attempt to bring the vapor temperature down by preventing the introduction of hot ambient air into the system, the dilution valve was closed. This did not solve the overheating problem so FLS contacted the system's design engineer at National Environmental Systems (NES) who requested additional information to assist in determining a solution. Specifically, NES requested pictures of the system's surroundings and a system inlet temperature reading.

Corrective Measures

FLS returned on July 15 to install a sampling port (VI 101) at the system influent and took a temperature reading. It was determined that the influent vapor temperature was generally similar to ambient air temperature.

In order to determine the sub-slab soil vapor temperature, FLS returned on July 29 to install sampling ports at the SVE manifold. The readings collected at the manifold, located in the building's cellar, revealed that the soil vapor temperature matches the sub-cellar's air temperature. After the port installations, FLS restarted the system to conduct an alarm test, which consisted of adjusting the temperature switch between 130°F (factory setting), 140°F (conservative), and 150°F (system maximum) while recording the temperature gauge (TI 102) reading when the high temperature alarm is triggered. Results are presented below.

TSH 101 Setting (°F)	**TI 102 Reading** (at shutdown, °F)	**Reading Difference** (°F)
130	122	8
140	128	12
150	130, no shutdown	N/A

The switch and gauge were installed only 6 inches apart and, as shown above, the reading correlation varies by up to 12°F. In both alarm trigger events, the system was prematurely inactivated. NES was notified of this discrepancy and decided that the existing switch may be damaged or inaccurately calibrated. Therefore, NES ordered a new switch, tested it in-house, and sent it to FLS.

On August 5, FLS installed the new switch and repeated the alarm test, with the initial setting at 120°F. The test results, shown below, revealed a consistent 8°F difference between the alarm's trigger and gauge temperatures. While the switch was set to 140F, the system's equilibrium temperature was 128°F.

With the system remaining operational at 140°F and the consistent reading correlation, FLS and NES agreed that setting the temperature switch to 140°F was the best course of action. Considering the new switch, switch setting and reading difference, a vapor temperature in excess of 132°F may trigger the alarm, but that temperature has not been previously observed at the system throughout the summer.

TSH 101 Setting (°F)	**TI 102 Reading** (at shutdown, °F)	**Reading Difference** (°F)
120	112	8
130	122	8
140	128, no shutdown	N/A

FLS returned to the Site on August 16 and the system was shut down from the high temperature alarm. FLS concluded that the vapor may have exceeded approximately 132°F at one point over the last week and, after consulting with NES, agreed that keeping the switch at 150°F would be the required setting for both keeping the system running and protecting the equipment. FLS had been hesitant at setting the switch to 150°F because it is maximum temperature rating for the hoses and carbon vessels.

On August 23, FLS trained the maintenance staff on how to take weekly readings for the system's operations, monitoring and maintenance. The system has operated continuously from August 23 to the date of this report.

Conclusion and Recommendation

The possible explanations considered for repeated high temperature alarms were: high temperature inlet air, high temperature dilution air, and a defective temperature switch. After confirming that the alarms were not a result of high temperature inlet or dilution air, FLS had a thoroughly tested switch installed. The new switch did not prevent the premature alarms when set at a conservative 140°F, so it was adjusted to the system's maximum temperature rating of 150°F.

After implementing the corrective measure, the system did not shut off during days in which ambient air temperatures exceeded 95°F. FLS recommends keeping the temperature switch set at 150°F for the duration of the system's operation. Should the high alarm temperature be triggered again, FLS will consider installing telemetry that would immediately notify personnel in the event of a shutdown.

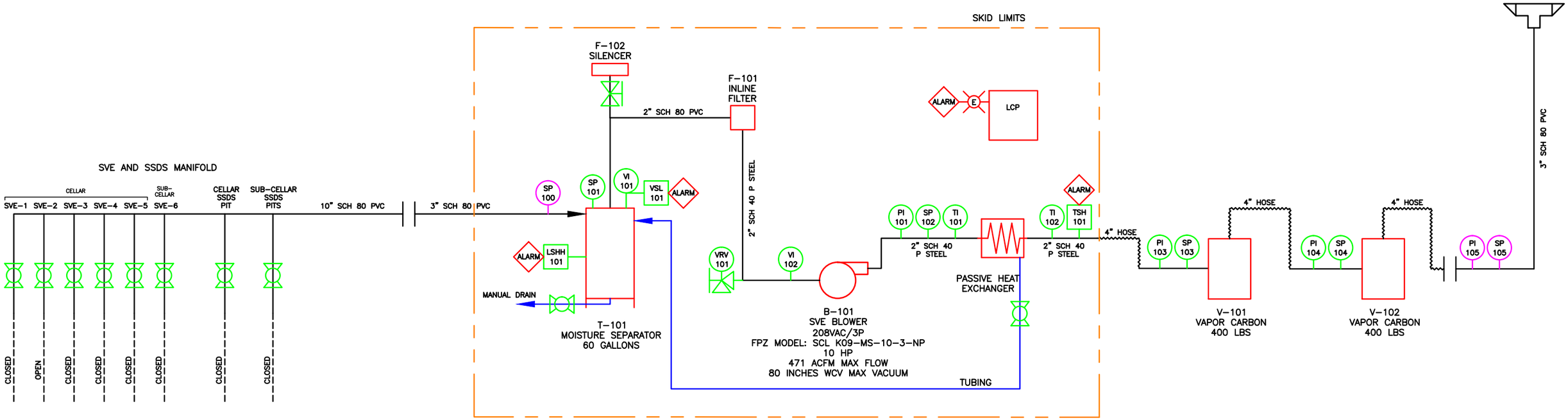
Please contact us with any questions.

Sincerely,
Fleming-Lee Shue, Inc.

Camila Israel
Sr. Project Manager

cc:	Roger Fortune	Stahl Realty
	Bridget Callaghan	NYSDOH
	Arnold Fleming, P.E.	Fleming-Lee Shue

enc: Attachment 1 – SVE System Process and Instrumentation Diagram



ABBREVIATIONS

PT	PRESSURE TRANSDUCER
SP	SAMPLING PORT
VI	VACUUM INDICATOR
TI	TEMPERATURE INDICATOR
LSHH	LEVEL SWITCH HIGH HIGH
VSL	VAPOR SWITCH LOW
VRV	VACUUM RELIEF VALVE
TSH	HIGH TEMPERATURE SWITCH

VALVES

- BALL VALVE
- VACUUM RELIEF VALVE
- GATE VALVE

NOTES:
1. DIAGRAM NOT TO SCALE
2. DIAGRAM NOT TO BE INTERPRETED AS A SYSTEM LAYOUT
3. SVE SYSTEM INSTALLED 11/14/2015, ORIGINAL CARBON ON-SITE
4. MAGENTA METERS WERE INSTALLED BY FLS ON 7/14/2016
5. CELLAR PIT IS #5, SUB-CELLAR PITS ARE #1-4
6. SVE SYSTEM SKID LOCATED ON 9TH FLOOR, MANIFOLD LOCATED IN CELLAR
7. THIS FIGURE IS A REVISED VERSION OF THE P&ID INCLUDED IN THE NES O&M MANUAL UPDATED TO REFLECT EXISTING CONDITIONS

DRAWN BY: A. CONTI

PROJECT MANAGER: C. ISRAEL

DATE: JULY 21, 2016

SITE: STAHL REAL ESTATE
388 BRIDGE STREET
BROOKLYN, NY 11201

TITLE: SOIL VAPOR EXTRACTION SYSTEM PROCESS AND INSTRUMENTATION DIAGRAM

REVISIONS

NO.	DATE	DESCRIPTION	BY

APPROVED

BY _____

Fleming Lee Shue
Environmental Management & Consulting

ARNOLD F. FLEMING, P.E.
&
FLEMING, LEE SHUE, INC.
158 WEST 29TH STREET, 9TH FL.
NEW YORK, NY 10001

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