

Indoor Air Assessment Report

Fourth Quarter 2018



Property:

North Lot Property
255 South King Street
Seattle, Washington

Prepared for:

255 S King Street LP
270 South Hanford Street, Suite 100
Seattle, Washington

January 14, 2019



Indoor Air Assessment Report

Fourth Quarter 2018

North Lot Property

Washington State Department of Ecology Facility ID 5378137
255 South King Street
Seattle, Washington

Prepared for:

255 S King Street LP
270 South Hanford Street, Suite 100
Seattle, Washington

Prepared by:

A handwritten signature in blue ink, consisting of several overlapping loops and a long horizontal stroke extending to the right.

Erin K. Rothman, M.S.
Managing Principal

Rothman & Associates
505 Broadway East, Ste 115
Seattle, Washington

January 14, 2019

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1.0 INTRODUCTION

Rothman & Associates has prepared this Fourth Quarter 2018 Indoor Air Assessment Report for the North Lot Property, located at 201 and 255 South King Street in Seattle, Washington (the Site), on behalf of 255 S. King Street LP to demonstrate compliance with the specific requirements of the cleanup action completed at the North Lot Property as part of a Consent Decree.

2.0 BACKGROUND

This section provides a description of the Site features and location, a summary of historical land use, and a description of the local geology and hydrogeology of the Site and adjoining parcels.

2.1 Site Location and Description

The Site, which is located at 201 and 255 South King Street in the Pioneer Square neighborhood of Seattle, Washington, includes two rectangularly-shaped tax parcels (King County Parcel Nos. 766620-4878 and 795300-0000) that cover approximately 168,573 square feet (3.87 acres) of land.

The location of the Site is shown on Figure 1. Figure 2 depicts a plan view/layout of the Site and locations of the compliance sampling points.

2.2 Land Use History of the Site

Based on a review of historical records and the findings of the Remedial Investigation (RI) completed by Landau Associates in 2011, the Site was originally undeveloped tide flats of Elliott Bay. The Site was filled in the late 1890s and early 1900s and operated as a rail yard from the late 1800s until the late 1960s. The fill material underlying the Site is composed of remnants of the former rail yard operations and construction debris (i.e., brick, metal, and concrete). Prior to filling, the Site was initially developed with streets, buildings, and railroad tracks elevated on and supported by pilings. Several sets of railroad tracks were formerly present on the Site. Structures associated with the rail yard included engine maintenance buildings, sand houses, coal houses, oil houses, and materials storage areas. King County purchased the Site in the 1970s to facilitate construction of the Kingdome stadium to the south of the Site, which was later demolished and replaced with the current CenturyLink Field and Event Center development. The Site was used as a parking lot since the 1970s. 255 S. King Street LP purchased the Property from NLD in August 2013 and redeveloped it with a high-rise hotel, residential, and commercial/retail buildings with belowground parking in 2014 and 2017. Construction of the hotel was completed in February 2018.

2.3 Regional Hydrogeology

The geology of the region is generally characterized by a thick sequence of glacial soil overlying tertiary bedrock, with local areas of exposed surficial bedrock. In general, the glacial stratigraphic sequence of the Puget Lowland consists of generally fine-grained, low-energy, non-glacial and glacial lacustrine and fluvial deposits overlain by glacial advance sand. The advance sand is overlain by glacial till, which, in turn is locally overlain by glacial recessional sand, where present, as well as organic-rich peat, lacustrine, and alluvial deposits. Where exposed, the glacial soil has been modified by mass wasting, stream erosion and deposition, and anthropogenic modifications (Booth et al. 2009).

The hydrogeology of the Puget lowland and Quaternary glacial soil includes near-surface, non-glacial alluvial deposits, perched water-bearing zones atop and within the glacial till soil or other consolidated fine-grained or cemented glacial deposits, and more persistent and higher yielding water-bearing zones present within the underlying glacial advance sands and older granular glacial and non-glacial deposits. The advance sands can be an important source of potable water supplies, particularly in suburban and rural locations within the Puget Lowland, while the water-bearing zones within the glacial till are not often exploited as a potable source as a result of significant seasonal fluctuations, low yield, and susceptibility to water quality degradation (Booth et al. 2009).

3.0 INDOOR AIR ASSESSMENT

The following is a summary of the steps and methodology completed as part of the assessment and in accordance with Washington State Department of Ecology's *Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action* (Ecology 2016) and the Consent Decree (CD).

3.1 Preliminary Assessment

A preliminary assessment of existing conditions determined that no chemicals of sufficient volatility and toxicity remain present beneath the Site. However, in accordance with the PPCD, indoor air samples were collected as discussed below.

3.2 Indoor Air Assessment (Tier II)

On December 17 & 18, 2018, Rothman & Associates conducted a round of indoor air sampling within the parking garage and on the roof of the building. The rooftop sample was collected to provide an ambient air sample for comparison. The event consisted of collecting one 8-hour, time-weighted average (TWA) sample from each of two proposed locations within the below-ground garage area: one sample from the parking area and one sample from an office or other use area within the garage, and one TWA sample from the roof of the building. The TWA samples were collected using 6-L laboratory-certified evacuated Summa canisters. Each Summa canister was equipped with a pressure gauge and a calibrated critical orifice air flow controller. *Samples were collected overnight in an effort to assess the potential impact of daytime traffic on benzene concentrations in both indoor and ambient air samples.*

To ensure that samples represented air from the receptor breathing space, the canister inlet valves were placed approximately 3 ft above floor surface for an office or other work area location where receptors would typically be seated, and approximately 5 ft above floor surface in the parking area, where receptors would typically be standing.

The TWA Summa canisters were evacuated to a vacuum pressure of 25 to 30 inches mercury (Hg) by the laboratory prior to sampling in the field. A final vacuum pressure reading greater than ambient (i.e., zero inches Hg) indicates a valid sample; however, canister closure would be targeted for 5 inches Hg to provide a margin of safety. Canister pressures were checked within 1 to 2 hours after beginning sampling to evaluate whether the air flow controllers are functioning properly. Any canisters observed to have a faulty flow controller are replaced with a backup canister and flow controller.

The indoor air samples were collected near the northeast corner of the parking garage (11003-BP) and within an occupied manager's office located near the southeast corner of the parking garage (11003-BO).

The ambient air sample was collected from the roof of the building, near the air intake for the parking garage (11003-RT). Locations were selected in accordance with the Compliance Monitoring Plan and based on proximity to the potential contaminants. All reasonable efforts were made to limit impacts from background contributions, such as household cleaners, paints, solvents, and automobile exhaust; however, the parking garage is active, so exhaust and gasoline were prevalent throughout.

After the samples were collected, the canisters were delivered to Friedman & Bruya, Inc. under standard chain of custody protocol. Benzene was analyzed according to Method TO-15 SIM.

3.3 Results

Benzene exceeded the Method B cleanup level of 0.32 $\mu\text{g}/\text{m}^3$ in all three samples; the highest concentration of benzene (1.0 micrograms per cubic meter [$\mu\text{g}/\text{m}^3$]) was located within the open area of the northeast corner of the parking garage. The concentration within the occupied office was 0.62 $\mu\text{g}/\text{m}^3$, which exceeds the Method B cleanup level but is well below L&I's permissible exposure limit (3,190 $\mu\text{g}/\text{m}^3$) and California Office of Environmental Health Hazard Assessment's acute and chronic reference exposure limits (27 $\mu\text{g}/\text{m}^3$ and 3 $\mu\text{g}/\text{m}^3$, respectively). The ambient air concentration was 0.34 $\mu\text{g}/\text{m}^3$, which likewise exceeded the Method B cleanup level of 0.32 $\mu\text{g}/\text{m}^3$.

Concentrations within the parking garage and office overnight were between 5 and 6 times lower than those measured during the day, suggesting that vehicle exhaust within the parking garage during active/daytime hours is impacting the air quality.

4.0 CONCLUSIONS

When contaminants are present in ambient outdoor air, it is common practice to subtract the outdoor air concentration from indoor air concentrations to evaluate whether there is a potential for vapor intrusion in indoor locations.

Considering (1) the presence of benzene in air at the roof of the building, 23 stories above ground level, (2) the proximity of the sample locations to exhaust, gasoline, and other sources of benzene, and (3) the lack of benzene detected in groundwater since quarterly groundwater monitoring was initiated at the Site in 2017, it appears unlikely that the past uses of the Site resulted in the benzene concentrations observed in indoor air.

5.0 LIMITATIONS

The findings and conclusions documented in this report have been prepared for specific application to this project and have been developed in a manner consistent with that level of care and skill normally exercised by members of the environmental science profession currently practicing under similar conditions in the area. No warranty, express or implied, is made regarding the information and recommendations provided in this report.

6.0 REFERENCES

Booth, Troost, Goetz, and Schimel. 2009. Geologic map of northeastern Seattle (part of the Seattle North 7.5' x 15' quadrangle), King County, Washington: U.S. Geological Survey Scientific Investigations Map 3065, scale 1:12000 and database.

Landau Associates. 2011a. Remedial Investigation Report, North Lot Development, Seattle, Washington. Prepared for North Lot Development, LLC. May 23.

Landau Associates. 2011b. Feasibility Study Report, North Lot Development, Seattle, Washington. Prepared for North Lot Development, LLC. May 23.

Landau Associates. 2011c. Cleanup Action Plan, North Lot Development, Seattle, Washington. Prepared for North Lot Development, LLC. July 1.

Landau Associates. 2011d. Engineering Design Report, North Lot Development, Seattle, Washington. Prepared for North Lot Development, LLC. July 5.

Landau Associates. 2012. Feasibility Study Addendum, North Lot Development, Seattle, Washington. Prepared for North Lot Development, LLC. September 27.

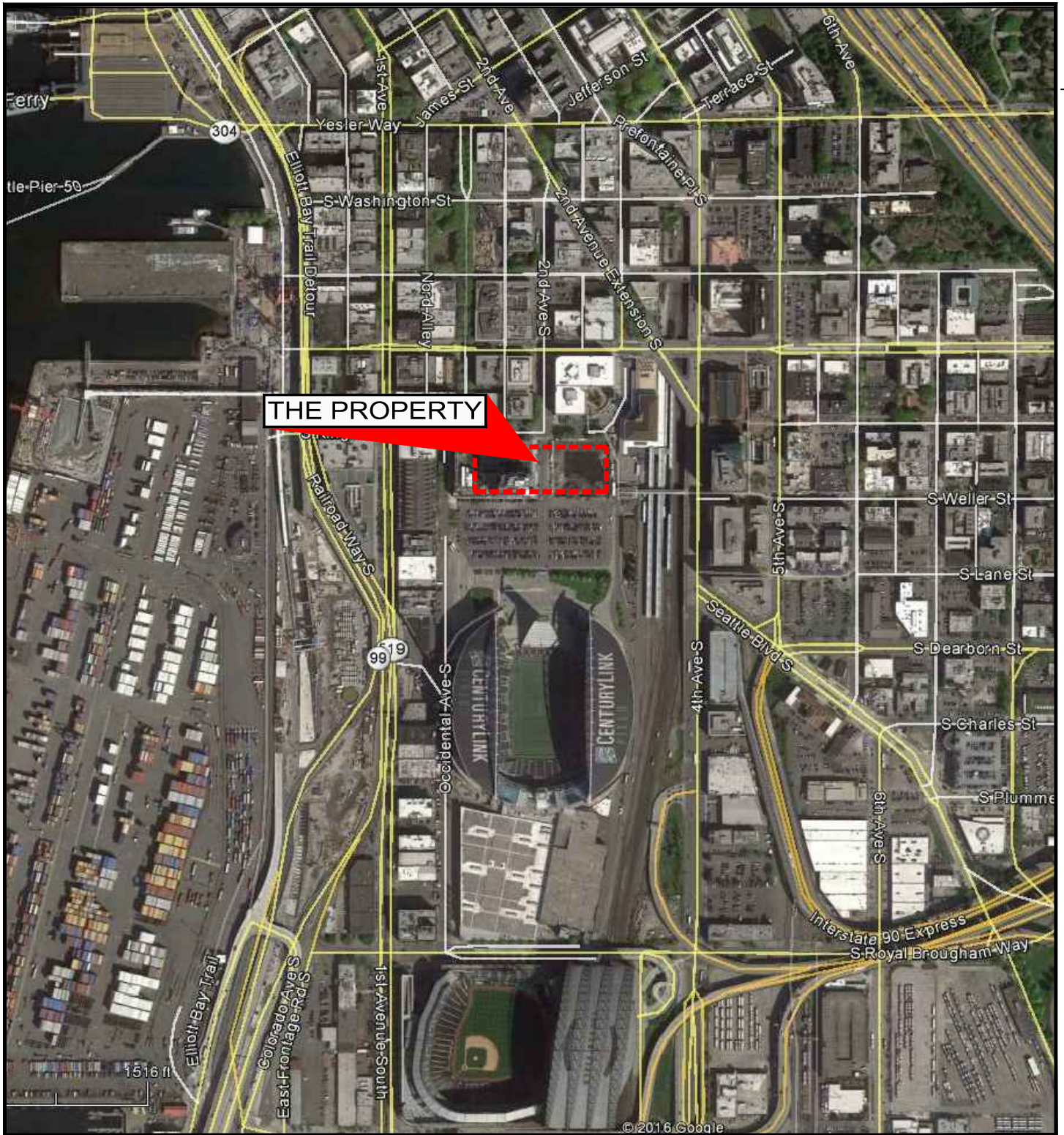
Landau Associates. 2013. Cleanup Action Plan Addendum, North Lot Development, Seattle, Washington. Prepared for North Lot Development, LLC. September 18.

Landau Associates. 2014. Engineering Design Report Addendum, North Lot Development, Seattle, Washington. Prepared for North Lot Development, LLC. February 28.

United States Environmental Protection Agency. 2017. Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells. EQASOP-GW4 Region 1 Low-Stress (Low-Flow) SOP, Revision Number 4. September 19.

Washington Department of Ecology. 2014. Table D-1 of the Consent Decree, Cleanup Action Schedule, North Lot Property, Seattle, Washington. January 14.

FIGURES



Reference: Google Earth



TITLE
PROPERTY
LOCATION MAP

PROJECT
255 SOUTH KING STREET
SEATTLE, WASHINGTON

PROJECT NO.
1008.001

PREPARED FOR
255 S KING STREET LP
270 SOUTH HANFORD STREET
SUITE 100
SEATTLE, WASHINGTON 98134

PREPARED BY
ROTHMAN & ASSOCIATES
505 BROADWAY EAST, STE 115
SEATTLE, WA 98102

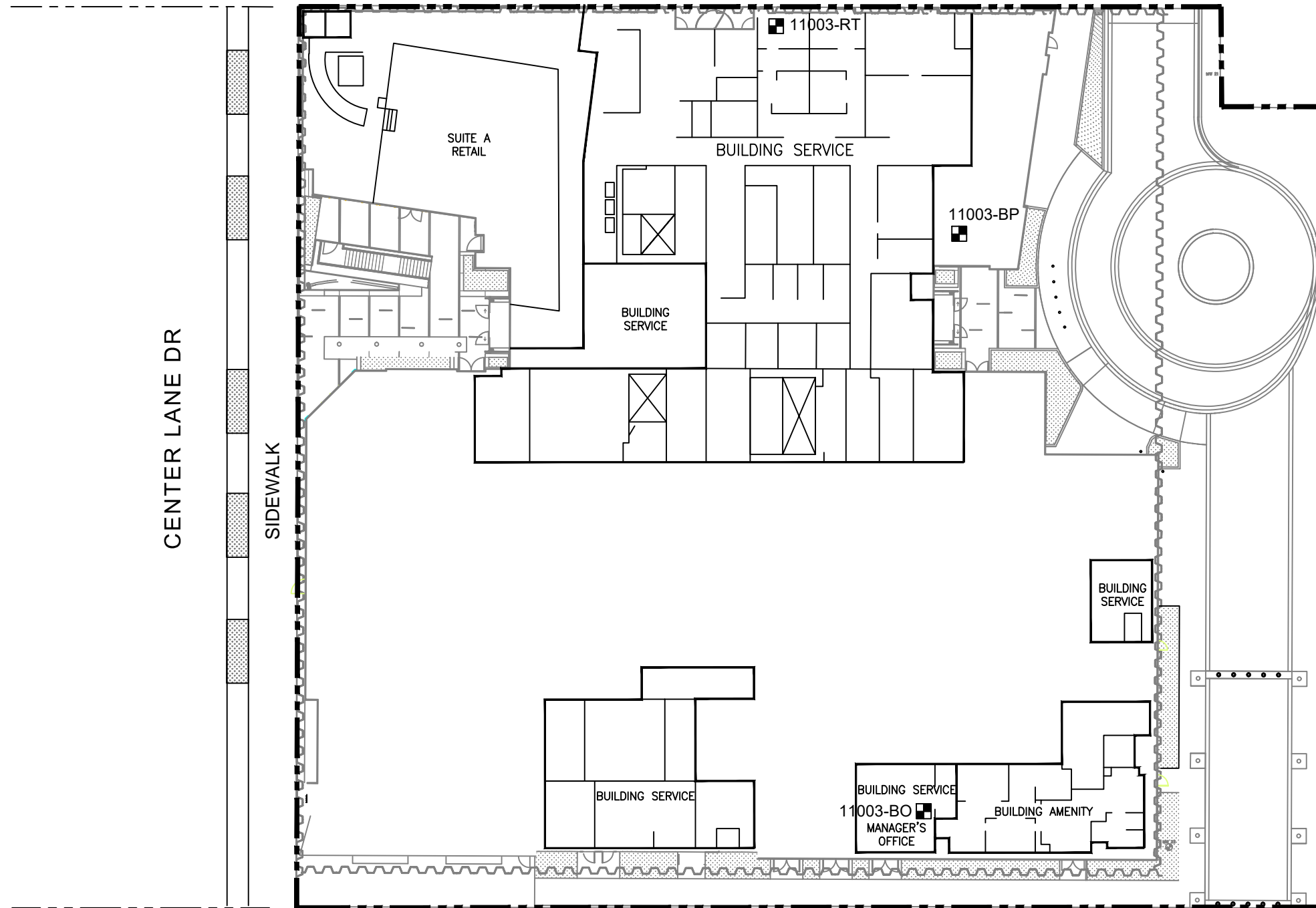
SCALE
NO SCALE

DATE
08.21.2017

FIGURE

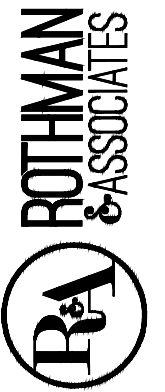
1

SOUTH KING STREET



PARCEL #
7666204880

LEGEND
 ■ INDOOR AIR SAMPLE LOCATIONS



PREPARED BY
 ROTHMAN & ASSOCIATES
 505 BROADWAY EAST STE 115
 SEATTLE, WASHINGTON 98102

PREPARED FOR
 255 S. KING STREET LP
 270 SOUTH HANFORD STREET, STE 100
 SEATTLE, WASHINGTON 98134

PROJECT
 NORTH LOT, EAST PARCEL
 255 S. KING STREET,
 SEATTLE, WASHINGTON

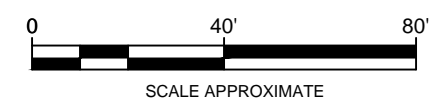
PROJECT NO.
 1008.001

TITLE
 INDOOR AIR SAMPLE
 LOCATIONS,
 BELOWGROUND PARKING
 GARAGE

FIGURE
2

SCALE 1"=40'

DATE
10.28.2018



TABLE



Table 1
Indoor Air Analytical Results
North Lot Property
201 and 255 South King Street
Seattle, Washington

Sample ID	Sample Location	Sample Date	Benzene ¹
11003-0201	Parking Space 58/59	03/27/18	3.5
11003-BP		09/28/18	5.6
11003-BP		12/18/18	1.0
11003-0202	Garage-level Manager's Office	03/27/18	0.76
11003-BO		09/28/18	3.8
		12/18/18	0.62
11003-RT	Rooftop; Below Air Intake	09/28/18	0.47
		12/18/18	0.34
Indoor Air Cleanup Levels ²			0.321
Labor & Industries DOSH Permissible Exposure Limit			3,190
OEHHA Acute REL			27
OEHHA Chronic REL			3

Data presented in micrograms per cubic meter

Bold data exceeds the Site-specific Indoor Air Cleanup Level

Gray text = occupational exposure limits

DOSH = Department of Safety and Health

OEHHA = California Office of Environmental Health Hazard Assessment

REL = reference exposure limit

¹Analyzed by Method TO-15 SIM

²Washington State Department of Ecology's *Guidance for Evaluating Soil Vapor Intrusion in Washington State*, Table B-1 Method B Indoor Air Cleanup Levels (adopted values of carcinogens, when available)

APPENDIX A

Laboratory Analytical Results

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

December 24, 2018

Erin Rothman, Principal
Rothman & Associates
505 Broadway E., Suite 115
Seattle, WA 98102

Dear Ms Rothman:

Included are the results from the testing of material submitted on December 18, 2018 from the North Lot 1009.001, F&BI 812258 project. There are 7 pages included in this report.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
RAA1224R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on December 18, 2018 by Friedman & Bruya, Inc. from the Rothman & Associates North Lot 1009.001, F&BI 812258 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Rothman & Associates</u>
812258 -01	11003-RT
812258 -02	11003-BO
812258 -03	11003-BP

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	11003-RT	Client:	Rothman & Associates
Date Received:	12/18/18	Project:	North Lot 1009.001, F&BI 812258
Date Collected:	12/18/18	Lab ID:	812258-01
Date Analyzed:	12/19/18	Data File:	121814.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MS/bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	83	70	130

Compounds:	Concentration	
	ug/m3	ppbv
Benzene	0.34	0.11

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	11003-BO	Client:	Rothman & Associates
Date Received:	12/18/18	Project:	North Lot 1009.001, F&BI 812258
Date Collected:	12/18/18	Lab ID:	812258-02
Date Analyzed:	12/19/18	Data File:	121815.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MS/bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	99	70	130

Compounds:	Concentration	
	ug/m3	ppbv
Benzene	0.62	0.19

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	11003-BP	Client:	Rothman & Associates
Date Received:	12/18/18	Project:	North Lot 1009.001, F&BI 812258
Date Collected:	12/18/18	Lab ID:	812258-03
Date Analyzed:	12/19/18	Data File:	121816.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MS/bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	89	70	130

Compounds:	Concentration	
	ug/m3	ppbv
Benzene	1.0	0.32

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	Rothman & Associates
Date Received:	Not Applicable	Project:	North Lot 1009.001, F&BI 812258
Date Collected:	Not Applicable	Lab ID:	08-2848 mb
Date Analyzed:	12/18/18	Data File:	121808.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MS/bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	93	70	130

Compounds:	Concentration	
	ug/m3	ppbv
Benzene	<0.32	<0.1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 12/24/18

Date Received: 12/18/18

Project: North Lot 1009.001, F&BI 812258

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES
FOR VOLATILES BY METHOD TO-15**

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ppbv	5	93	70-130

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The compound is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits. Compounds in the sample matrix interfered with the quantitation of the analyte.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

812258

SAMPLE CHAIN OF CUSTODY

ME 12/18/18

Page 1 of 1

Report To Erin Rothman

Company Rothman Associates

Address _____

City, State, ZIP _____

Phone (206) 395-0138 Email erin@rothmanassociates.com

SAMPLERS (signature)		PROJECT NAME		REPORTING LEVEL		INVOICE TO	
		North Lot		Indoor Air <input checked="" type="checkbox"/> Sub Slab/Soil Gas		Erin	
PO #		1009.001		TO-15 Full Scan		TO-15 BTEXN	
INVOICE TO		Erin		TO-15 cVOCs		TO-15 Benzene	
Standard <input checked="" type="checkbox"/> RUSH		Rush charges authorized by:		Flow Control <input checked="" type="checkbox"/> NP 12/18		Notes	
SAMPLE DISPOSAL		Dispose after 30 days <input checked="" type="checkbox"/> Archive Samples <input type="checkbox"/> Other		Turnaround Time			

Sample Name	Lab ID	Canister ID	Flow Contr. ID	Date Sampled	Field Initial Press. (Hg)	Field Initial Time	Field Final Press. (Hg)	Field Final Time	TO-15 Full Scan	TO-15 BTEXN	TO-15 cVOCs	TO-15 Benzene	Flow Control <input checked="" type="checkbox"/>	Notes
11003-RT	01		05352	12/18/18	24.5	2:28	9.5	5:58				X	08181	
11003-BO	02	23227	07854	12/18/18	24.5	2:20	5.5	5:50				X	07854	
11003-BP	03		08181	12/18/18	24.25	2:24	7.25	5:52				X	05352	

Samples received at 20°C

Friedman & Bruja, Inc.
 3012 16th Avenue West
 Seattle, WA 98119-2029
 Ph. (206) 285-8282
 Fax (206) 283-5044
 FORMS\OOD\COCTO-15.DOC

SIGNATURE		PRINT NAME		COMPANY		DATE		TIME	
		Jack Taylor		EHSI		12/18/18		12:58	
Relinquished by:		HOUT Brouwer		FBI					
Received by:									