Associated Environmental Group, LLC

March 1, 2022

Ms. Keum Woo
6730 Troon Lane SE
Olympia, Washington 98501-5179
keumwoo@hotmail.com

RE: **Technical Memorandum – Vapor Mitigation System Installation**
Lacey Urban Center
7131-7269 Martin Way East
Olympia, Washington 98516
AEG Project Number: 18-236

Dear Ms. Woo:

Associated Environmental Group, LLC (AEG) has prepared this Technical Memorandum for the purpose of presenting a summary of the vapor mitigation system installation activities performed at *Lacey Urban Center*, located at the above-referenced address in Olympia, Washington (Site) and as shown on Figure 1, *Vicinity Map*. The objective of the work was to mitigate the potential for subsurface vapor associated with a historical release from migrating into the indoor space of the Site building, which would otherwise create an inhalation hazard. This system is intended to operate for the foreseeable future. The Site's current layout and sample locations are illustrated in Figure 2, *Site Map*.

BACKGROUND

The *Lacey Urban Center* shopping center consists of four buildings, occupying one footprint with a total square footage of approximately 89,000 square feet, and the shopping center occupies a 4-acre area and multiple tax parcels. The building that housed the former dry cleaner from 1965 to 1997 is a slab-on-grade, single-story masonry building located in the western portion of the shopping center. Occupancy of the multi-tenant shopping center has primarily been for retail, office, and service tenants, and have included a bank, barber shop, post office, donut shop, drapery shop, hair salon, drug store, restaurants, shoe repair, floral and gift shops, nail shops, bakery, dentist and chiropractic center.

Based on a Phase I Environmental Site Assessment (ESA) performed by Partner Engineering and Science, Inc. (Partner) in 2018, the Site was occupied by a dry-cleaning business from circa 1965 through approximately 1997. The dry-cleaning business occupied the southwestern corner of the multi-tenant building. The Site was formerly served by an on-Site septic system, with the septic tank serving the dry-cleaning building. The tank was located adjacent to the south of the building and the leachfield was located adjacent to the west of the building.

On April 1, 2021, AEG submitted a Remedial Investigation and Feasibility Study (RI/FS) Report to the Washington State Department of Ecology (Ecology) for review. The RI/FS included a summary of the Site characterization work performed at the Site to date, and an evaluation of potential cleanup alternatives for the documented impacts to soil and soil vapor. Based on the work performed to date, no exceedances of MTCA Method B cleanup levels were identified within the indoor air; however, concentrations of tetrachloroethylene (PCE), a common dry-cleaning solvent, were detected in sub-slab vapor above MTCA Method B sub-slab screening levels (see attached Table 1, *Summary of Indoor Air and Sub-Slab Vapor Analytical Results*). An exceedance of these screening levels indicates the contaminant is present at a concentration that has the potential to migrate into indoor air. To address this potential, AEG's preferred alternative included the installation of a vapor mitigation system to resolve the soil-to-vapor pathway and the potential for vapor intrusion, followed by closure with institutional controls to address any remaining potentially complete exposure pathways.

On September 14, 2021, Ecology issued an opinion stating that upon completion of the proposed cleanup (installation of a vapor mitigation system and institutional controls memorialized by an environmental covenant), no further remedial action will likely be necessary to clean up contamination at the Site.

Vapor Mitigation System Installation Activities

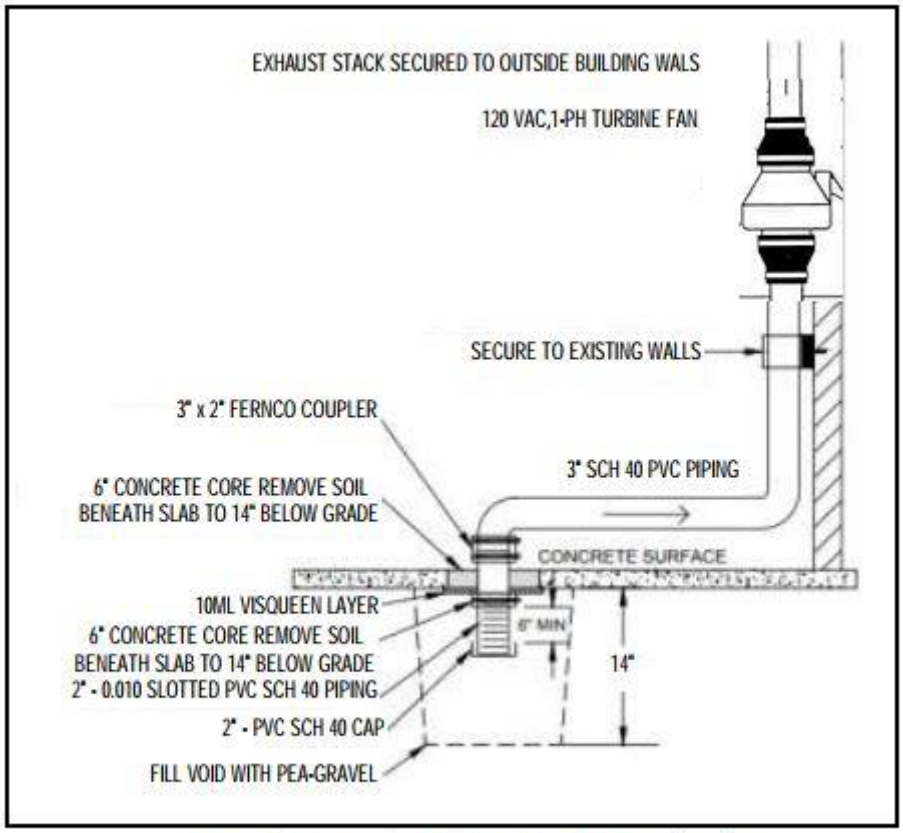
On December 8, 2021, AEG personnel along with a Washington licensed contractor installed two vapor mitigation points (SSD-1 and SSD-2) in the occupied laundromat. The SSD points provide a pressure differential (vacuum) using vertical vapor collection points installed through the concrete floor, while connecting the points to air conveyance piping to an outlet pipe on the building's roof. The Site's current layout and SSD locations are illustrated in Figure 2, *Site Map*, and photographs of the installation are included in Appendix A, Supporting Documents, *Site Photographs*.

Specific tasks associated with SSD installation activities were as follows:

- Advanced a 4-inch concrete boring bit to a sufficient depth to bore through the existing building floor in each of the two areas.
- Hand-excavated a 14-inch sump horizontally and vertically beneath the concrete, installed a 2-inch slotted PVC extraction pipe, and backfilled each sump with clean pea gravel followed by a concrete seal.
- Installed PVC conveyance piping to allow access to the building wall and attached the piping to the outside of the building, extended to 3 feet above the roof line.
- Cut in wall penetrations and installed a 3-inch diameter schedule 40 PVC pipe for the conveyance piping, an in-line weather-proof radial blower (KTA-150 LV Fan) equipped with a condensation bypass, explosion-proof motor, and control box with status display.

- Provided electrical power to the fan and secured conveyance piping to the building and the outside wall surface.

The system exhaust stack was located a sufficient distance from all windows, doors, heating and ventilation systems, and other exhaust points to prevent a reintroduction of extracted constituent vapors. The exhaust stack was terminated approximately 3 feet above the roof line. The final locations and layout of the exhaust stacks are shown in Appendix A, Supporting Documents, *Site Photographs*. A schematic of a typical SSD system installation is illustrated below.



TYPICAL SUBSLAB VAPOR POINT (NTS)

Planned Next Steps

AEG intends to perform a follow-up round of indoor air sampling to confirm PCE and its daughter products are still below MTCA cleanup levels. In addition, AEG will sample the SSD systems via the sampling ports to confirm sub-slab vapors are being redirected to the outdoor air. The results of these sampling events will be provided under separate cover, and will include a draft environmental covenant for Ecology review.

If you have any comments or questions, please contact our office at your convenience at 360.352.9835.

Sincerely,

Associated Environmental Group, LLC

Scott Rose, L.H.G.
Senior Hydrogeologist

State of Washington
Hydrogeologist
2635
Licensed Geologist
SCOTT I ROSE

Attachments: Figure 1 – *Vicinity Map*
Figure 2 – *Site Map*
Table 1 – *Summary of Indoor Air and Sub-Slab Vapor Analytical Results*
Appendix A – Supporting Documents
Site Photographs

FIGURES

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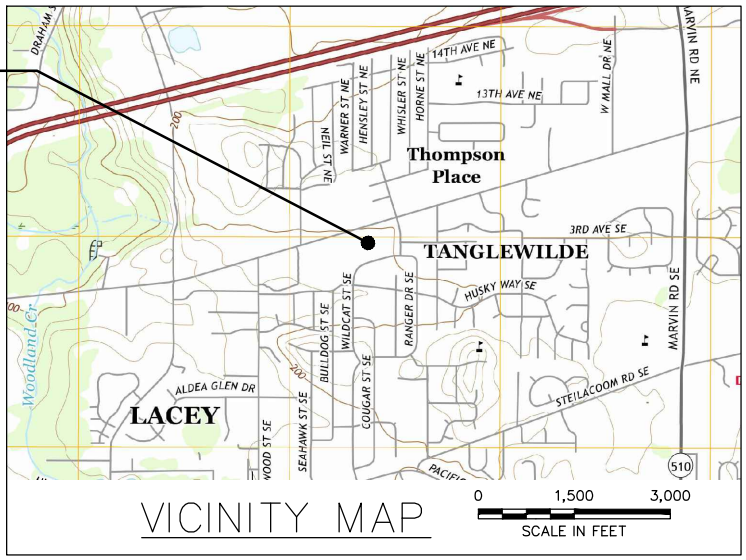
FILENAME	DRAWN BY		CHECKED BY		APPROVED BY		PROJECT NUMBER
18-236_1804.DWG	ICD	12/26/2018	BD	12/26/2018	BD	12/26/2018	18-236

N
W E
S

PROJECT LOCATION



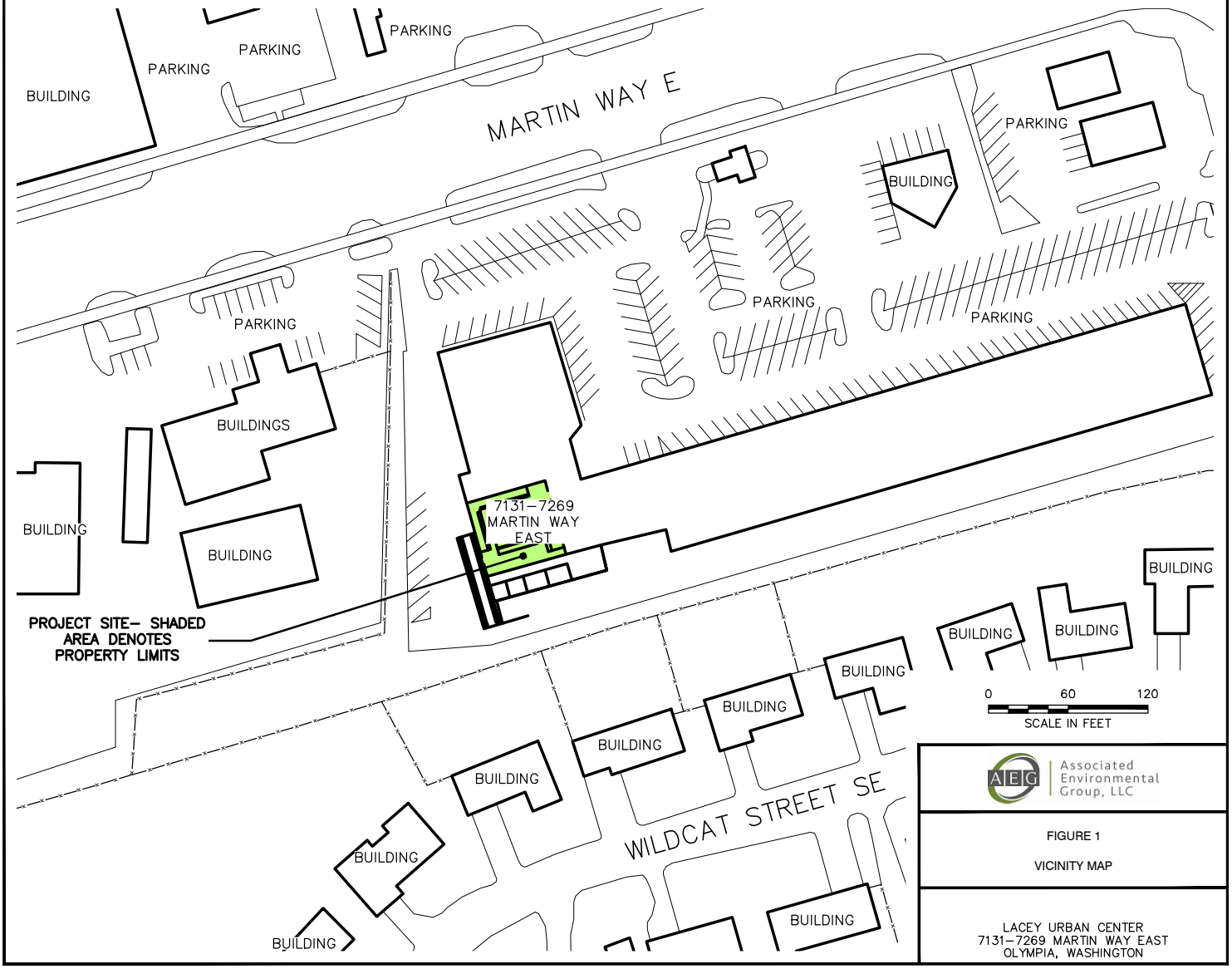
VICINITY MAP

NOTES

1. THE LOCATIONS OF ALL FEATURES SHOWN ARE APPROXIMATE
2. THIS DRAWING IS FOR INFORMATION PURPOSES. IT IS INTENDED TO ASSIST IN SHOWING FEATURES DISCUSSED IN AN ATTACHED DOCUMENT.

REFERENCE

DRAWING CREATED FROM AERIAL PHOTOGRAPH AND NOTES PROVIDED BY AEG, LLC.
VICINITY IMAGE SOURCE: U.S. GEOLOGICAL SURVEY–2017, 7.5 MINUTE QUADRANGLE MAP
OLYMPIA, WASHINGTON



Associated Environmental Group, LLC

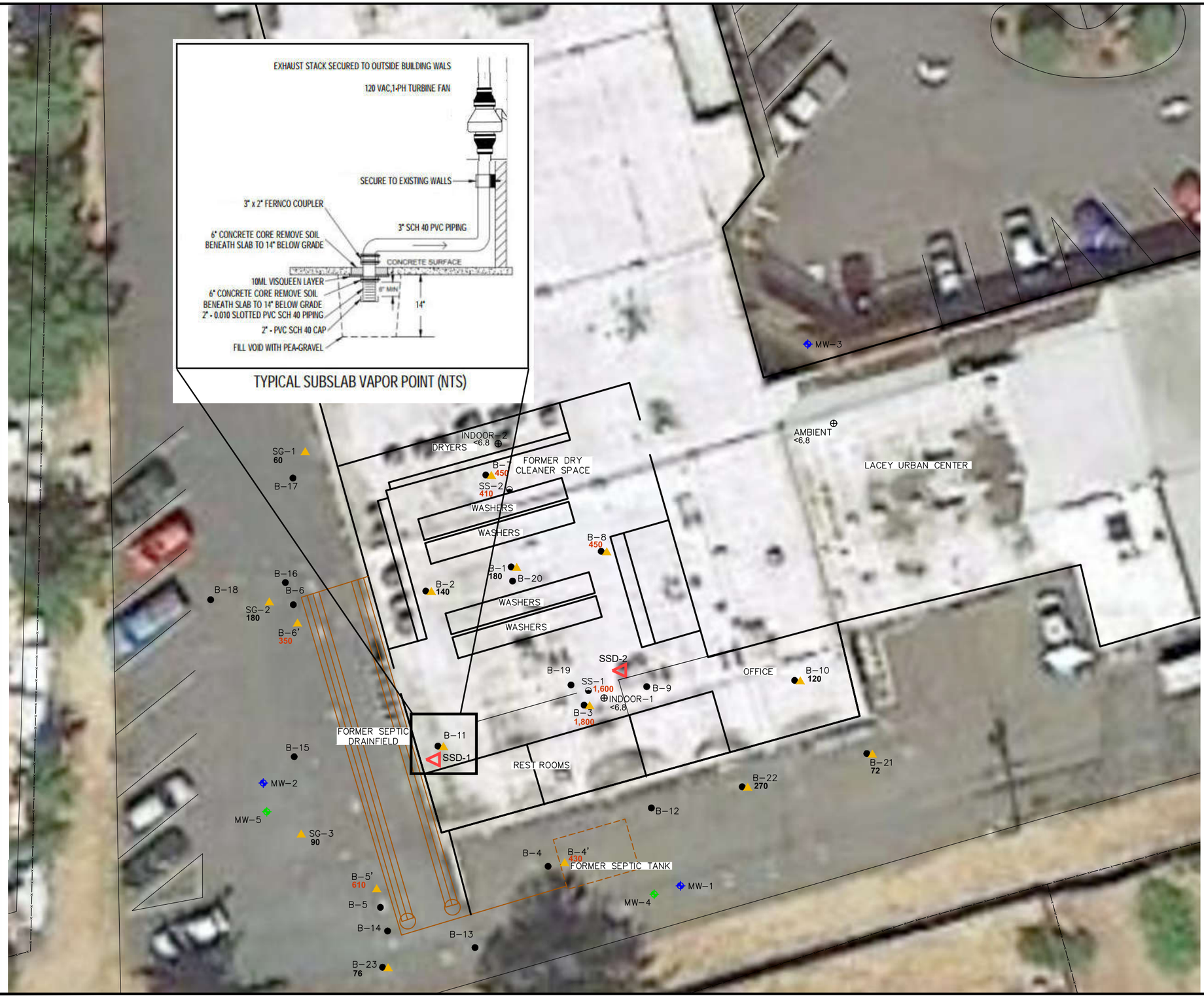
FIGURE 1

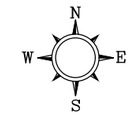
VICINITY MAP

LACEY URBAN CENTER
7131–7269 MARTIN WAY EAST
OLYMPIA, WASHINGTON

FILENAME	CHECKED BY	DRAWN BY	APPROVED BY	PROJECT NUMBER
18-236_2101_1.DWG	CS 3/25/2021	ICD 3/25/2021	CS 3/25/2021	18-236

TYPICAL SUBSLAB VAPOR POINT (NTS)





LEGEND

MW-1	SHALLOW MONITORING WELL LOCATION
MW-4	DEEP MONITORING WELL LOCATION
SG-1	SOIL GAS SAMPLE LOCATION
B-1	SOIL BORING LOCATION
SS-1	SUB-SLAB VAPOR SAMPLE LOCATION
AMBIENT	AIR SAMPLE LOCATION
—x—x—	FENCE
SSD-1	SUB-SLAB VAPOR POINT
450	PCE CONCENTRATION IN SOIL VAPOR ($\mu g/m^3$)
$\mu g/m^3$	MICROGRAMS PER CUBIC METER
PCE	TETRACHLOROETHYLENE
<	NOT DETECTED ABOVE LIMIT NOTED

RED BOLD INDICATES THE DETECTED CONCENTRATION EXCEEDS ECOLOGY MTCA METHOD B SCREENING LEVELS

BOLD INDICATES THE DETECTED CONCENTRATION IS BELOW ECOLOGY MTCA METHOD B SCREENING LEVELS

NOTES

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REFERENCE

DRAWING CREATED FROM AERIAL PHOTOGRAPH AND NOTES PROVIDED BY AEG, LLC.

0 10 20
SCALE IN FEET

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FIGURE 2

SITE MAP

LACEY URBAN CENTER
7131-7269 MARTIN WAY EAST
OLYMPIA, WASHINGTON

TABLES

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Table 1 - Summary of Indoor Air and Sub-Slab Vapor Analytical Results
Lacey Urban Center
Olympia, Washington

Sample ID		Indoor-1	Indoor-2	Ambient	Method B Indoor Air Cleanup Level	Indoor-1	Indoor-2	Ambient	Method B Indoor Air Cleanup Level	SS-1	SS-2	Method B Sub-Slab Screening Level
Date Collected		11/20/2019	11/20/2019	11/20/2019		10/29/2020	10/29/2020	10/29/2020		10/29/2020	10/29/2020	
TO-15 - Volatile Organic Compounds	Vinyl Chloride	<0.128	<0.128	<0.128	0.28*	<0.26	<0.26	<0.26	0.28*	<8.9	<1.8	9.33*
	trans-1,2-Dichloroethylene	<0.198	<0.198	<0.198	NL	<0.4	<0.4	<0.4	NL	<14	<2.8	NL
	cis-1,2-Dichloroethylene	<0.198	<0.198	<0.198	NL	<0.4	<0.4	<0.4	NL	<14	<2.8	NL
	Trichloroethylene	<0.269	<0.269	<0.269	0.37*	<0.11	<0.11	<0.11	0.37*	<3.8	<0.75	12.3*
	Tetrachloroethylene	**1.29**	**2.10**	<0.269	9.62*	<6.8	<6.8	<6.8	9.62*	**1,600**	**410**	321*

Notes:

All values presented in micrograms per cubic meter ($\mu g/m^3$)

-- = Not analyzed for constituent

< = Not detected above laboratory limits

* Cancer cleanup/screening level (all other constituents listed have non-cancer values)

Bold indicates the detected concentration is below Ecology MTCA Method B cleanup or screening levels

Red Bold indicates the detected concentration exceeds Ecology MTCA Method B cleanup or screening levels

NL = Not Listed; no cleanup/screening levels have been promulgated for these constituents

APPENDIX A

Supporting Documents:
Site Photographs

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PROPERTY AND VICINITY PHOTOGRAPHIC RECORD

Project No.: 18-236

Project Name: Lacey Urban Center, Olympia, Washington
March 1, 2022

				
Photo # 1	SSD-1		Photo # 2	Bottom of SSD-1
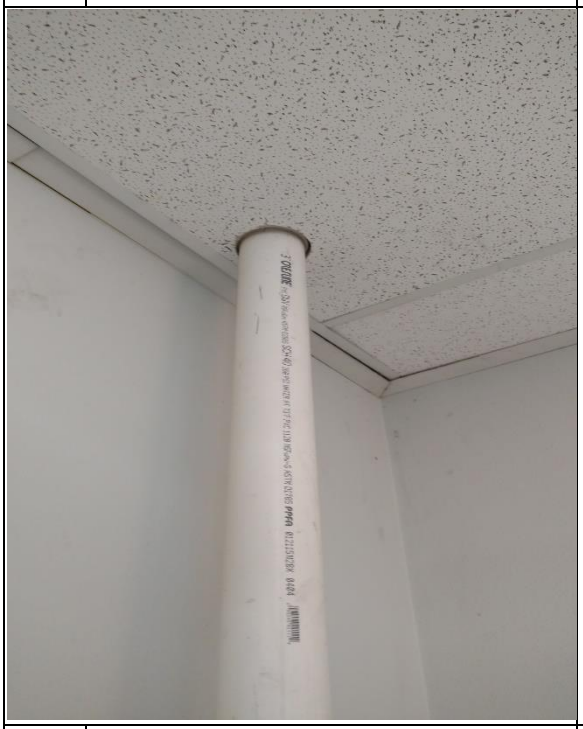				
Photo # 3	Top of SSD-1		Photo # 4	Sample port of SSD-1

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PROPERTY AND VICINITY PHOTOGRAPHIC RECORD

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March 1, 2022

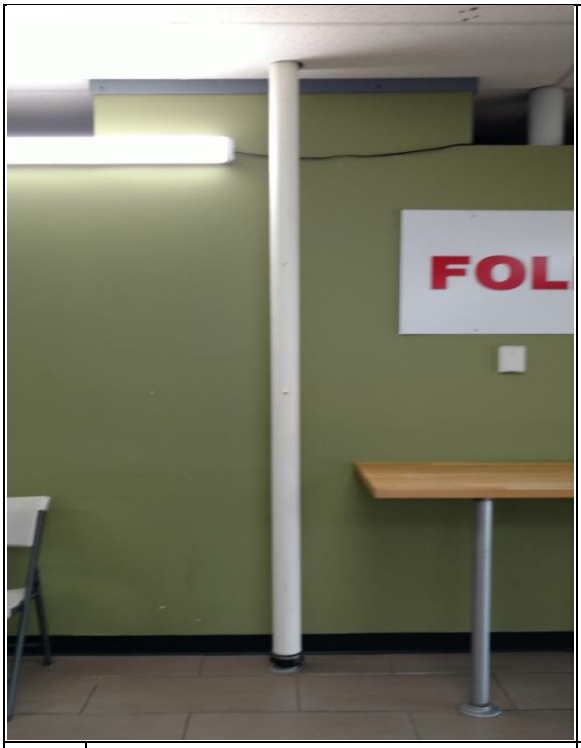				
Photo # 5	SSD-2		Photo # 6	Bottom of SSD-2
				
Photo # 7	Top of SSD-2		Photo # 8	Sample port of SSD-2

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PROPERTY AND VICINITY PHOTOGRAPHIC RECORD

Project No.: 18-236 **Project Name: Lacey Urban Center, Olympia, Washington**
March 1, 2022

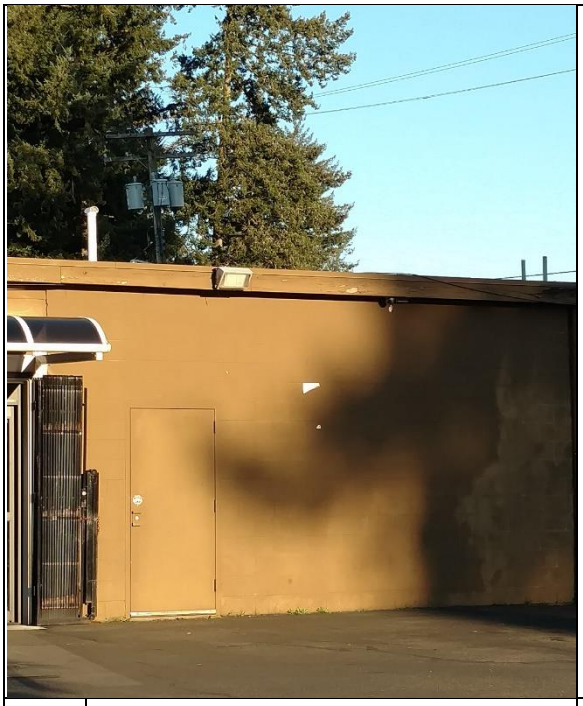				
Photo # 9	Exhaust port on roof near back entrance			

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