



December 6, 2018

Ms. Tahni Madden
CHI Franciscan Health
1149 Market Street, MS-10-06
Tacoma, Washington 98402-3515

RE: TECHNICAL MEMORANDUM – Vapor Mitigation System Installation
Franciscan Medical Clinic
4550 Fauntleroy Way SW
Seattle, Washington 98126-3471
AEG Project No. 18-172

Dear Ms. Madden:

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 the Franciscan Medical Clinic, located at the above-referenced address in Seattle, Washington (Site). The Site work was completed over a weekend to allow access to all areas within the lower level of the building and parking areas. The objective of work was to address health concerns and reduce the petroleum vapors detected within the building. This system is intended to operate until such time that BP West Coast Products, LLC (BP) finishes their investigation of the petroleum impact to Site subsurface associated with the adjacent Shell site to the west.

AEG also performed a ground penetrating radar (GPR) survey to determine whether any potential sources (other than the adjacent fueling station) may be present due to historical usage of the Site. The survey was focused on the parking lot area north of the Site building where elevated soil gas concentrations were measured.

Background Information

Indoor air sampling was performed by NOW Environmental Services (NOW), and AEG performed soil gas and sub-slab vapor sampling at the Site. This sampling effort was performed to determine if vapors noted by clinic staff warranted mitigation measures, and whether they were potentially sourced from the adjacent Shell station to the west (currently undergoing cleanup activities). Figure 1, *Site Vicinity Map*, presents the general vicinity of the Site.

On May 3, 2018, NOW collected two indoor air samples from within the Storage Room and Exam Room No. 3. The samples were analyzed using gas chromatography/mass spectrometry (GC/MS) under an established quality assurance/quality control (QA/QC) program. Analytical results of the

samples indicated the presence of Gasoline-Range Organics (GRO) and multiple volatile organic compounds (VOCs) at concentrations exceeding their respective Model Toxics Control Act (MTCA) Method B indoor air cleanup levels.

On May 23, 2018, NOW returned to the Site and collected two indoor air samples from within Exam Room No. 3 and the Back Office Pod. Analytical results of the samples indicated the presence of GRO and multiple VOCs at concentrations exceeding their respective MTCA Method B indoor air cleanup levels.

On July 26, 2018, AEG advanced five soil gas borings (SGV-1 through SGV-5) west of the clinic structure to approximately 13 feet below ground surface (bgs), and eight sub-slab vapor points (SS1 through SS8) within the western side of the basement of the clinic structure. Groundwater was not encountered in any of the borings. Soil gas and sub-slab vapor samples were analyzed for the presence of air-phase hydrocarbons (APH) and VOCs via Method TO-15. Analytical results of the vapor samples indicated the presence of APHs and multiple VOCs at concentrations exceeding their respective MTCA Method B sub-slab screening levels. The sample locations are illustrated in Figure 2, *Soil Gas and Vapor Sample Locations Map*.

Based on the vapor assessment work performed to date at the Site, conclusions and recommendations provided by AEG included the following:

- GRO, APH, and gasoline-related VOCs are present in indoor air, sub-slab vapor, and soil gas at concentrations exceeding their respective MTCA Method B indoor air cleanup levels and sub-slab screening levels. The source of these constituents is likely from the adjacent Shell station where one or more releases from underground storage tank (UST) systems have occurred to date, and free product is present in the groundwater.
- Vapors are migrating/intruding by way of differential subsurface pressures when HVAC systems are functioning at their normal duty loads within the Franciscan Medical Clinic.
- These vapors are impacting the Clinic and should be mitigated.
- Installation of a vapor mitigation system with manifolded sub-slab depressurization (SSD) points in Exam Room 3, employee break room, and the storage room on the western portion of the building. The idea of the SSD system was not to remove mass of vapor phase contaminants for soil remediation but to remove a sufficient volume of air to establish vacuum gradient beneath the concrete floor slab. The airflow and vacuum field would intercept potential VOC vapors prior to reaching the building basement wall or sub-slab areas currently impacted.

A more detailed summary of these investigations and results is presented in AEG's *Technical Memorandum – Vapor Assessment*, dated September 24, 2018.

Sub-Slab Depressurization System Installation Activities

On November 3, and 4, 2018, AEG personnel along with a Washington licensed contractor and electrician installed three SSD points located in the Exam Room 3, employee break room, and the storage room, respectively, in the basement of the clinic building. 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 a central point above the acoustic drop ceiling. The Site's current layout and SSD locations are illustrated in Figure 3, *Sub-Slab Depressurization Point Locations*, and photographs of the installation are included in Appendix A, *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 (approximately 6 inches thick) in each of the three areas.
- Hand-excavated a 10- to 12-inch sump horizontally and vertically, 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 one central location to allow access to the roof area through the western employee exit door, and attached the piping to the outside of the building on the western wall.
- Cut in wall penetration (2-inch diameter) and installed a 2-inch diameter schedule 40 PVC pipe from the conveyance piping an in-line weather-proof radial blower (Obar GBR78), equipped with a condensation bypass, explosion-proof motor, and control box on the roof surface.
- Provided electrical power to the fan and secured conveyance piping to the building rafters and the roof surface.
- Installed a sampling port on the riser pipe, approximately 5 feet off of the building floor.

The system exhaust stack was located on the roof 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 surface. The location and layout of the exhaust stack are illustrated on Figure 4, *Roof Locations for Vacuum Equipment*, and Figure 5, *Vacuum Blower Unit Roof Installation*, respectively.

The system was turned on, and an initial vapor sample was collected from each SSD to be used as a baseline point for comparison to future vapor samples. The system was operated for approximately 45 minutes prior to collecting the vapor samples. The vapor samples were collected from the sampling port near the building floor via a vacuum sample box into a 1-liter Tedlar sample bag, and

submitted to Libby Environmental, Inc., a Washington State-accredited analytical laboratory, for analysis for GRO and BTEX vapors using EPA Method 8260C.

Analytical results of the samples did not indicate the presence of GRO or BTEX constituents at any of the three SSD locations after 45 minutes of system operation. Copies of the laboratory datasheets are provided in Appendix B, *Laboratory Results*.

AEG recommends periodic vapor sampling from the SSD points and from the indoor air to confirm the SSDs are collecting vapors from the sub-slab fill material, and redirecting them to the roof vacuum system.

Ground Penetrating Radar Site Scan

On November 3, 2018, AEG along with Applied Professional Services, Inc. (APS) performed a scan of the parking lot using Ground Penetrating Radar (GPR) to see if any underground storage tanks (USTs) were present based on the past use of the property. After a completed scan of the exposed and unblocked parking lot, it was determined that there were no USTs or other anomalies present at the Site.

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

Sincerely,

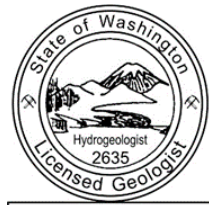
Associated Environmental Group, LLC



Charles S. Swift, R.S.A.
Project Manager



Scott Rose, L.H.G.
Senior Hydrogeologist



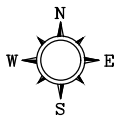
SCOTT | ROSE

- Attachments: Figure 1 – *Site Vicinity Map*
Figure 2 – *Soil Gas and Vapor Sample Locations Map*
Figure 3 – *Sub-Slab Depressurization Point Locations*
Figure 4 – *Roof Locations for Vacuum Equipment*
Figure 5 – *Vacuum Blower Unit Roof Installation*

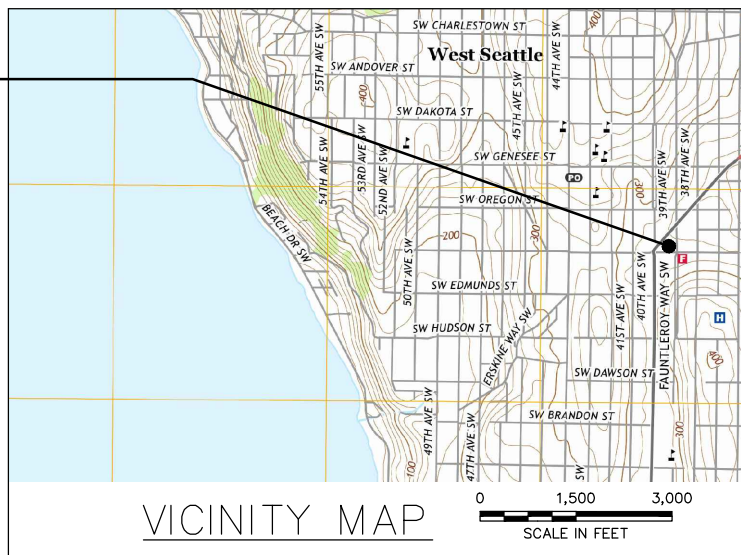
- Appendix A – *Site Photographs*
Appendix B – *Laboratory Results*

FIGURES

FILENAME 18-172_1803.DWG	DRAWN BY ICD	CHECKED BY SL	APPROVED BY SL	PROJECT NUMBER 18-172
	8/8/2018	8/8/2018	8/8/2018	



PROJECT LOCATION

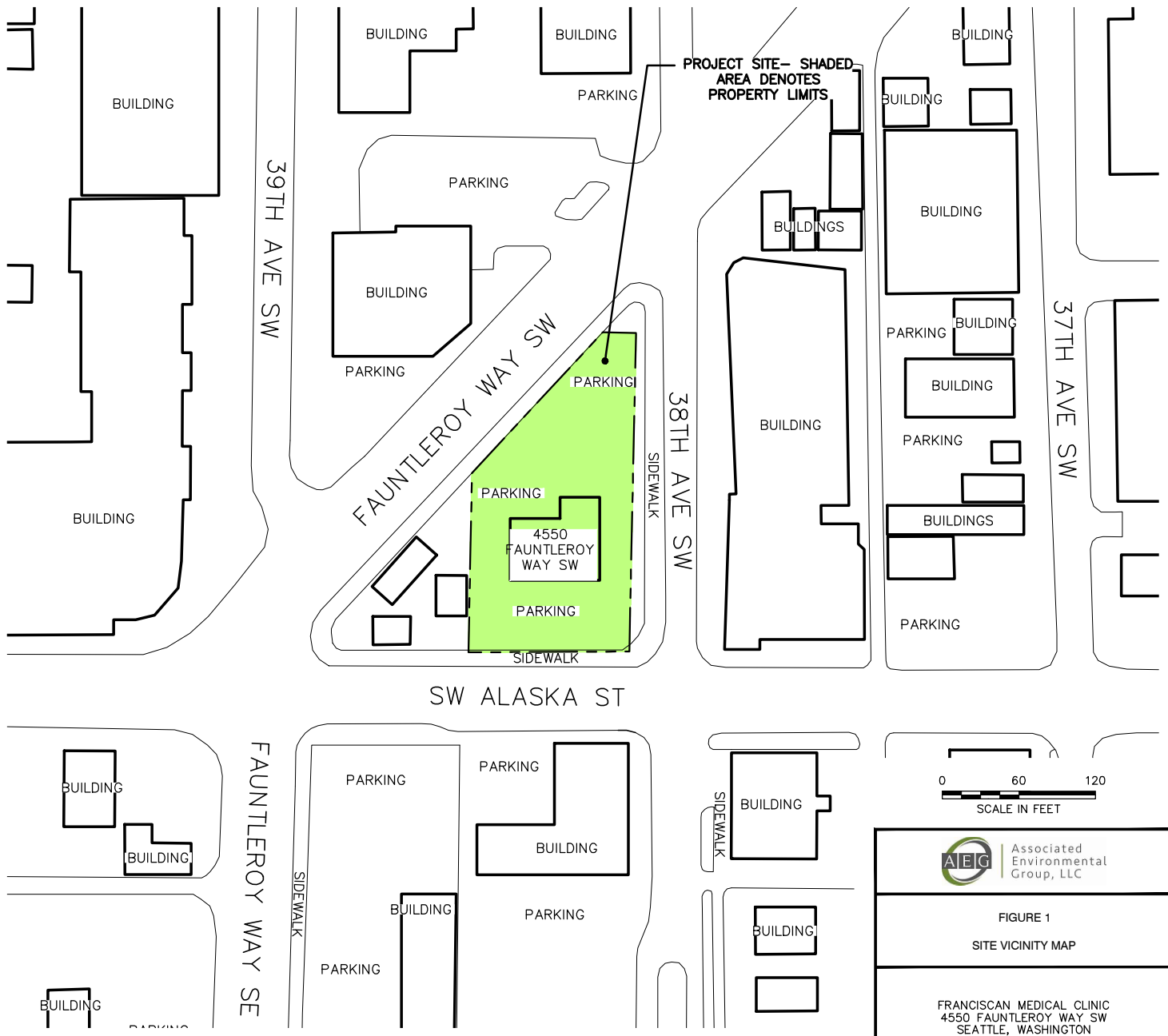


NOTES

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.

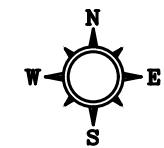
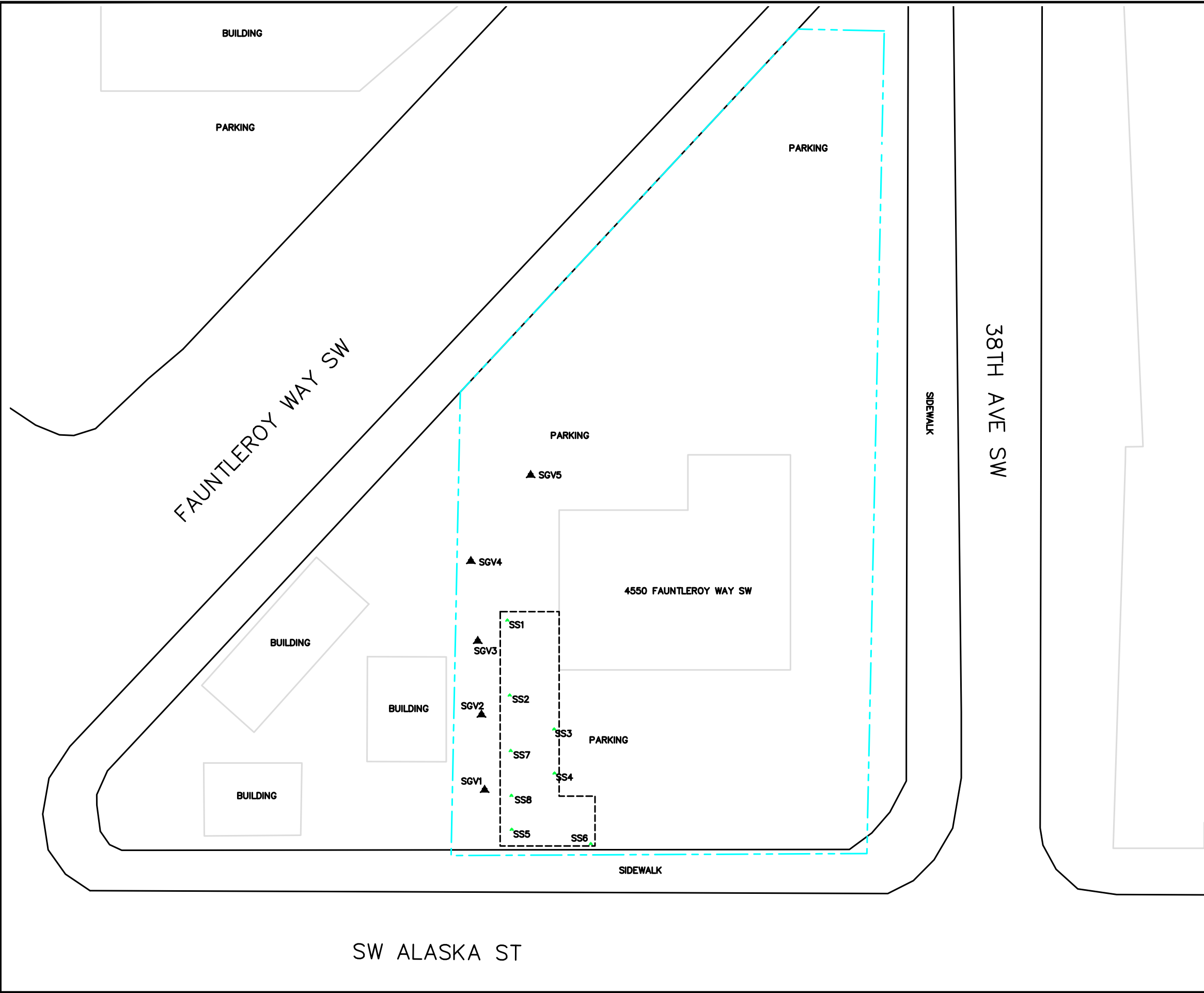
REFERENCE

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



 Associated Environmental Group, LLC
FIGURE 1
SITE VICINITY MAP
 FRANCISCAN MEDICAL CLINIC
 4550 FAUNTLEROY WAY SW
 SEATTLE, WASHINGTON

FILENAME 18-172_1803.DWG
 DRAWN BY ICD 8/21/2018
 CHECKED BY SL 8/21/2018
 APPROVED BY SL 8/21/2018
 PROJECT NUMBER 18-172



- LEGEND**
- PROPERTY LINE
 - SAMPLED PART OF THE BASEMENT
 - ▲ SUBSLAB VAPOR SAMPLE LOCATIONS
 - ▲ APPROXIMATE SOIL VAPOR BORING

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

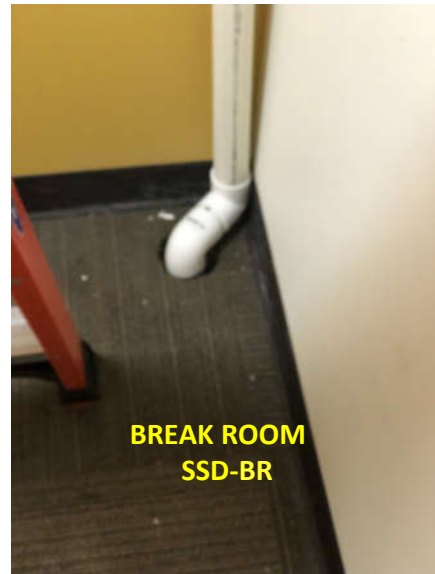
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DRAWING CREATED FROM AERIAL PHOTOGRAPH AND NOTES PROVIDED BY AEG, LLC.

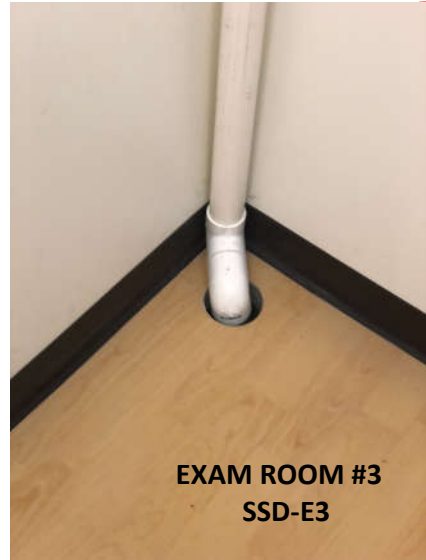


FIGURE 2
 SOIL GAS AND VAPOR SAMPLE
 LOCATIONS MAP

FRANCISCAN MEDICAL CLINIC
 4550 FAUNTLEROY WAY SW
 SEATTLE, WASHINGTON



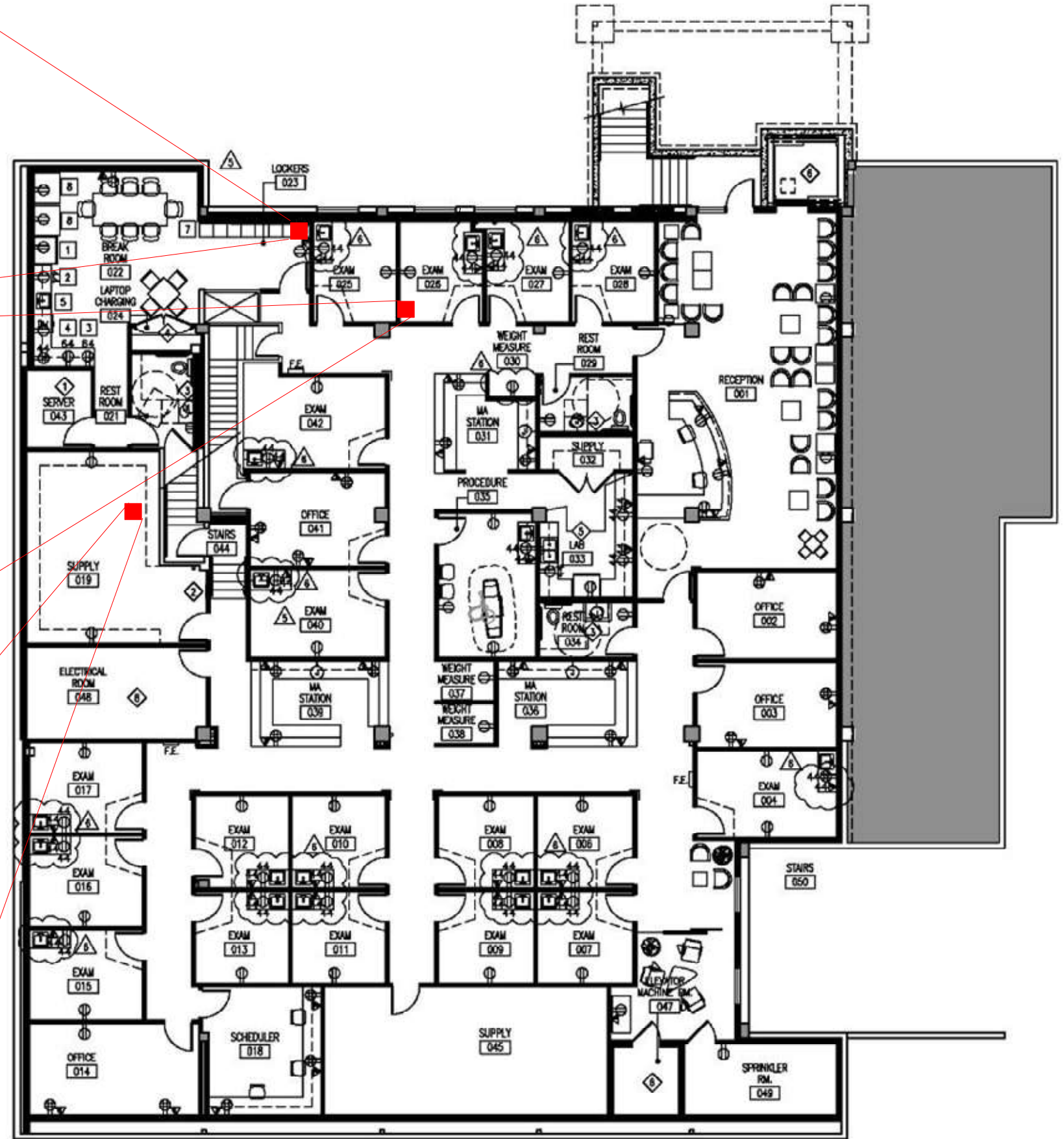
**BREAK ROOM
SSD-BR**




**EXAM ROOM #3
SSD-E3**



**STORAGE ROOM
SSD-SR**



 Associated Environmental Group, LLC	FIGURE 3			
	SUB-SLAB DEPRESSURIZATION POINT LOCATIONS FRANCISCAN WEST SEATTLE, WASHINGTON			
PROJECT: 18-172	SIZE	FSCM NO	DWG NO	REV
	SCALE	1 : 1	SHEET	1 OF 3




FINAL BLOWER
LOCATION

4550 Fautleroy Way SW

100 ft




 Associated Environmental Group, LLC	FIGURE 4			
	ROOF LOCATIONS FOR VACUUM EQUIPMENT			
SIZE	FSCM NO	DWG NO	REV	
SCALE	1 : 1	SHEET	2 OF 3	



- 4-Foot exhaust stack with rain cover
- Electrical connection (120 VAC, 1-ph, 15 amps)
- Removable inlet for maintenance
- Conveyance piping from SSDs in basement over the existing parapet wall.



- GBR76 SOE 16" WC @ 0 Max flow 155 CFM.
- Built in speed control to customize performance.
- Condensate bypass built in.

 Associated Environmental Group, LLC	FIGURE 5			
	VACUUM BLOWER UNIT ROOF INSTALLATION FRANCISCAN WEST SEATTLE, WASHINGTON			
PROJECT: 18-172	SIZE	FSCM NO	DWG NO	REV
	SCALE	1 : 1	SHEET	3 OF 3

APPENDIX A


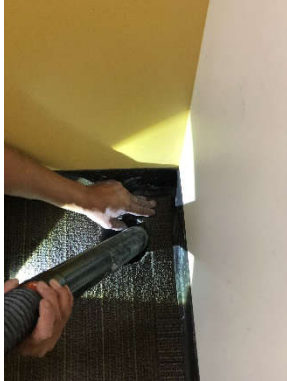




Site Photographs



SITE PHOTOGRAPHIC RECORD

Project No.: 18-172

Project Name: Franciscan Medical Clinic

			
Photo #1:	Coring drilling for SSD-SR in Storage Room	Photo #2:	Removing base material for SSD-BR in the Employee Break Room.
			
Photo #2:	SSD-E3 in Exam Room #3 conveyance pipe installed and ready for concrete seal.	Photo #4:	SSD-BR in Employee Break Room connected to conveyance piping in drop ceiling.
			
Photo #5:	SSD-SR in Storage Room completed.	Photo #6:	Typical piping installation in drop ceiling space showing the existing building utilities.



SITE PHOTOGRAPHIC RECORD

Project No.: 18-172

Project Name: Franciscan Medical Clinic

<p>Photo #7: Conveyance piping through wall above westside exit door.</p>	<p>Photo #8: Conveyance piping crossing stairwell to the outside of building to the roof.</p>
<p>Photo #9: Conveyance piping on the westside of the building through the wall and to the roof.</p>	<p>Photo #10: Conveyance piping attached to west wall showing drop leg condensate drain valve.</p>
<p>Photo #11: Vacuum unit and exhaust attached to roof facing west.</p>	<p>Photo #12: GPR survey in the parking lot area.</p>

APPENDIX B

Laboratory Results



Libby Environmental, Inc.

4139 Libby Road NE • Olympia, WA 98506-2518

November 7, 2018

Charlie Swift
Associated Environmental Group, LLC
605 11th Avenue SE, Suite 201
Olympia, WA 98501

Dear Mr. Swift:

Please find enclosed the analytical data report for the West Seattle Franciscan Project located in Seattle, Washington.

The results of the analyses are summarized in the attached tables. Applicable detection limits and QA/QC data are included. The sample(s) will be disposed of in 30 days unless we are contacted to arrange long term storage.

Libby Environmental, Inc. appreciates the opportunity to have provided analytical services for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Sherry L. Chilcutt
Senior Chemist
Libby Environmental, Inc.

Libby Environmental, Inc.

WEST SEATTLE FRANCISCAN PROJECT
AEG, LLC
Seattle, Washington
Libby Project # L181105-2
Client Project # 18-172

4139 Libby Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@gmail.com

Analyses of Gasoline (NWTPH-Gx) & BTEX (EPA Method 8260C) in Vapor

Sample Number	Date Analyzed	Benzene ($\mu\text{g}/\text{m}^3$)	Toluene ($\mu\text{g}/\text{m}^3$)	Ethylbenzene ($\mu\text{g}/\text{m}^3$)	Xylenes ($\mu\text{g}/\text{m}^3$)	Gasoline ($\mu\text{g}/\text{m}^3$)	Surrogate Recovery (%)
Method Blank	11/5/18	nd	nd	nd	nd	nd	90
LCS	11/5/18	94%	121%				104
SSD-BR	11/5/18	nd	nd	nd	nd	nd	96
SSD-E3	11/5/18	nd	nd	nd	nd	nd	97
SSD-SR	11/5/18	nd	nd	nd	nd	nd	87
SSD-SR Dup	11/5/18	nd	nd	nd	nd	nd	95
Practical Quantitation Limit		100	200	100	300	10000	

"nd" Indicates not detected at the listed detection limits.

"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (Toluene-d8): 65% TO 135%

ANALYSES PERFORMED BY: Kodey Eley

Libby Environmental, Inc.

4139 Libby Road NE

Olympia, WA 98506

Phone: (360) 352-2110

FAX: (360) 352-4154

Email: libbyenv@gmail.com

WEST SEATTLE FRANCISCAN PROJECT
AEG, LLC

Libby Project # L181105-2

Date Received 11/5/2018

Time Received 9:10 AM

Received By SC

Sample Receipt Checklist

Chain of Custody

1. Is the Chain of Custody is complete? Yes No
2. How was the sample delivered? Hand Delivered Picked Up Shipped

Log In

3. Cooler or Shipping Container is present. Yes No N/A
4. Cooler or Shipping Container is in good condition. Yes No N/A
5. Cooler or Shipping Container has Custody Seals present. Yes No N/A
6. Was an attempt made to cool the samples? Yes No N/A
7. Temperature of cooler (0°C to 8°C recommended) NA °C
8. Temperature of sample(s) (0°C to 8°C recommended) NA °C
9. Did all containers arrive in good condition (unbroken)? Yes No
10. Is it clear what analyses were requested? Yes No
11. Did container labels match Chain of Custody? Yes No
12. Are matrices correctly identified on Chain of Custody? Yes No
13. Are correct containers used for the analysis indicated? Yes No
14. Is there sufficient sample volume for indicated analysis? Yes No
15. Were all containers properly preserved per each analysis? Yes No
16. Were VOA vials collected correctly (no headspace)? Yes No N/A
17. Were all holding times able to be met? Yes No

Discrepancies/ Notes

18. Was client notified of all discrepancies? Yes No N/A

Person Notified: _____

Date: _____

By Whom: _____

Via: _____

Regarding: _____

19. Comments. _____

