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Memorandum

To: Steve Teel, Washington State Department of Ecology

Copies: Drew Zaborowski, Avenue 55; Scott Hooton, Port of Tacoma

From: Tom Colligan and Kristin Anderson, Floyd|Snider

Date: June 8, 2018

Re: **Summary of Soil Vapor Survey Data and Vapor Mitigation Plan for the 1514 Taylor Way Site**

This memorandum summarizes the results of soil vapor sampling performed at the 1514 Taylor Way redevelopment site (the Site) in Tacoma, Washington, and recommends next steps for mitigation and further evaluation. The sampling was performed in accordance with the approved Sampling Plan presented in Appendix B to the Interim Action Work Plan for the Site. That plan called for a methane survey and vapor intrusion (VI) assessment at the above development location. The methane survey and soil vapor sample collection for volatile organic compound (VOC) analysis were completed during multiple field events between December 2016 and May 2018 due to wet weather conditions that hampered efforts to complete the survey during one mobilization. Soil vapor survey locations are shown on Figure 1.

VAPOR SURVEY FINDINGS

The vapor survey on the two building pads (location 1 and locations 4 through 18) was performed using direct-push drilling methodology. Location 18 was originally in a construction drive aisle but was moved east approximately 30 feet to the edge of building pad A due to traffic safety concerns.

Groundwater is generally shallow at the Site (i.e., less than 2 feet below grade). Groundwater levels were measured prior to sampling by advancing closed rods at intended survey location and measuring the depth to water in the resultant borehole. Sampling points were then set at a depth of 5 feet below grade or 6 inches to 1 foot above the measured water table if water was encountered above 5 feet. Methane survey samples were collected via post-run tubing methodology and allowed to equilibrate for a minimum of 2 hours prior to sampling. VOC samples were collected via 8-inch-long temporary stainless steel vapor sample implants. Implants were allowed to equilibrate for a minimum of 8 hours prior to sampling, per email approval from the Washington State Department of Ecology (Ecology). All survey sample points installed via drilling were sealed using hydrated bentonite at time of installation. At each location, a minimum of three volumes of the annular space and tubing were purged using a peristaltic pump prior to sample collection.

The vapor survey in the drive aisle between the two building pads (locations 19, 20, and 21) could not be completed via drilling because groundwater was encountered at a depth less than 2 feet below grade. Therefore, the survey in the drive aisle was performed by placing a bucket at the ground surface and sealing the base of the bucket and inlet for sample tubing with plumbers' putty. The concentration of accumulated methane was measured at 30-minute intervals for a minimum equilibration time of 2 hours. Location 19 in the drive aisle was moved northeast approximately 30 feet due to heavy vehicle and equipment traffic during construction on this portion of the Site.

The methane survey was performed using a Landtec GEM 2000 landfill gas meter. Methane concentrations were measured while purging with a peristaltic pump until the reading stabilized. Methane percentages measured in soil vapor ranged from 0.0% to 1.4%. The greatest methane detections were 0.6% and 1.4%, measured on building pad A at location 10 and location 3, respectively. Methane survey results are shown on Figure 1.

A helium leak detection test for the methane survey methodology was performed during the February 2018 event. No helium was detected at the sample outlet.

Soil vapor at the methane survey locations was also screened for VOCs using a photoionization detector (PID), and concentrations were low-level, ranging from 0.0 to 0.6 parts per million vapor (ppmv).

Samples for VOC analysis were collected at locations 9, 12, and 16 during two events, the first in mid-April 2018 (locations 9 and 12) and the second in mid-May 2018 (locations 9 and 16). In a deviation from the work plan, location 12 was targeted for VOC sampling instead of location 13 because a usable vapor implant was installed at the adjacent location 12 during the February 2018 event. In addition, a second sample from location 9 was collected during the May event to verify April results.

VOC samples were collected using laboratory-supplied 1-liter evacuated SUMMA canisters. Helium leak detection was performed on samples collected at location 9 and location 12 during the April 2018 event, and helium concentrations measured in the sample canisters did not exceed 10 percent of the helium shroud concentrations. PID readings at the VOC sample locations ranged from 0.0 to 1.3 ppmv (location 9). An ambient air sample was also collected using an evacuated SUMMA canister placed at building pad A during the May 2018 sampling event.

Vapor samples were analyzed for VOCs and air-phase hydrocarbons (APHs) in accordance with the Interim Action Work Plan. A summary of results is shown in Table 1. Lab reports and field collection forms are in Attachment 1. Detected concentrations are compared to the Model Toxics Control Act (MTCA) Method C industrial screening levels for sub-slab soil vapor. At location 9 on building pad A, the chloroform concentration in the May 2018 sample collected exceeded the MTCA Method C cancer screening level. None of the target analytes were detected at concentrations exceeding their screening levels at location 12 or in the ambient air sample. At location 16 on building pad B, concentrations of APHs, acetaldehyde, benzene, chloroform, and

naphthalene exceeded their respective cancer or non-cancer screening levels. However, the sample at location 16 was delivered to the lab with excessive vacuum and therefore low sample volume as a consequence of the presence of excessive soil moisture within the pad B backfill; residual moisture in the vapor sample have caused a bias to high concentrations.

VAPOR MITIGATION CONSTRUCTION

As a consequence of the presence of multiple VOCs in the soil gas samples, some at concentrations exceeding appropriate screening levels, Avenue 55 elected to install a passive vapor mitigation system in Building A, specifically under each of the two office "node" locations of this large industrial warehouse currently under construction, as well as under each of the two office nodes planned for Building B. The office areas were selected for vapor mitigation because they are areas of higher occupancy and much more limited interior volume, so they have a higher potential for vapor intrusion exposure. The remaining warehouse spaces have extremely large interior volumes (Building A covers 3 acres and is 30 feet high; Building B is 1 acre and of a similar height) and so may or may not need to have a vapor mitigation system. A decision to implement either passive or active vapor mitigation in the warehouse interiors will be made after submittal of a supplement work plan to Ecology to collect additional indoor air and sub-slab vapor data to better evaluate the risk of vapor intrusion to the warehouse space of both buildings.

The passive system under the office nodes was designed by Herrera Environmental Consultants. The vapor mitigation plans for the passive system are included in Attachment 2. The system includes perforated PVC piping laid in trenches under the subgrade of the office area and covered with a 30 millimeter PVC membrane under the concrete floor. The PVC piping subgrade is tied to vertical vents to be run up the side of the building. The vertical vents allow the addition of an in-line blower if necessary based on future monitoring results and also allow the collection of samples to evaluate soil gas conditions under the membrane. The addition of an in-line blower would then convert the system from one relying on passive ventilation driven by atmospheric pressure differentials to an active system that maintains a negative pressure under the floor slab.

To date, Herrera has performed two inspections of the installation of the office node vapor mitigation system under construction in Building A. The first inspection was to observe the installation of the perforated piping, and the next to document the construction of the membrane prior to the floor slab being poured. Those field inspection reports are included in Attachment 2.

LIST OF ATTACHMENTS

Table 1	Summary of Soil Gas Data for Taylor Way Property
Figure 1	Vapor Survey Sample Locations and Methane Results
Attachment 1	Lab Report and Field Form
Attachment 2	Vapor Mitigation Plans and Field Inspection Reports

Table

Table 1
Summary of Soil Gas Data for Taylor Way Property

				Sample ID	Loc 9	Loc 12	Ambient	Loc 9	Loc 109[1]	Loc 16
				Sample Location	Building A	Building A	Ambient	Building A	Building A	Building B
				Sample Date	4/18/2018	4/18/2018	5/8/2018	5/8/2018	5/8/2018	5/8/2018
Analyte	CAS No.	Units	Sub Slab Method C Non Cancer	Sub Slab Method C Cancer						
Volatiles by MA-APH										
APH EC5-8 aliphatics	--	µg/m³	200,000	--	1,500	2,200	63	3,100 ve	3,500 ve	24,000 ve
APH EC9-12 aliphatics	--	µg/m³	10,000	--	510	380	35 U	1,600	2,600	**24,000 ve**
Volatiles by TO-15										
1,1,1-Trichloroethane	71-55-6	µg/m³	170,000	--	24	13	0.55 U	44	45	2.2 U
1,1,2,2-Tetrachloroethane	79-34-5	µg/m³	--	14	1.4 U	1.4 U	0.14 U	0.21 U	0.21 U	2.1
1,1-Dichloroethane	75-34-3	µg/m³	--	520	4 U	5	0.4 U	2.1	2.1	1.6 U
1,1-Dichloroethene	--	µg/m³	--	--	4 U	4 U	0.4 U	0.76	0.76	1.6 U
1,2,3-Trimethylbenzene	--	µg/m³	--	--	25 U	25 U	2.5 U	3.7 U	7.3	66
1,2,4-Trimethylbenzene	95-63-6	µg/m³	230	--	25 U	25 U	2.5 U	6.4	13	120
1,2-Dibromoethane (EDB)	--	µg/m³	--	--	0.77 U	0.77 U	0.077 U	0.12 U	0.12 U	0.77 fb
1,2-Dichloroethane (EDC)	107-06-2	µg/m³	230	32	0.73	0.97	0.097	2.3	2.3	0.79
1,2-Dichloropropane	78-87-5	µg/m³	130	83	2.3 U	2.3 U	0.23 U	2.9	2.8	0.92 U
1,3,5-Trimethylbenzene	--	µg/m³	--	--	25 U	25 U	2.5 U	5.4	9.2	69
1,3-Butadiene	106-99-0	µg/m³	67	28	0.22 U	0.22 U	0.046	0.033 U	0.033 U	0.088 U
1,3-Dichlorobenzene	541-73-1	µg/m³	--	--	25	6 U	0.6 U	2.6	1.2	11
1,4-Dichlorobenzene	106-46-7	µg/m³	27,000	76	2.4 U	2.4 U	0.24 U	0.36 U	0.36 U	1.6 fb
2-Butanone (MEK)	--	µg/m³	--	--	29 U	29 U	2.9 U	6.5	7.2	65
2-Propanol	--	µg/m³	--	--	86 U	86 U	8.6 U	13 U	13 U	290
Acetaldehyde	75-07-0	µg/m³	300	380	90 U	90 U	9 U	52	62	**330**
Acetone	67-64-1	µg/m³	--	--	48 U	190	8.9	110	110	290
Benzene	71-43-2	µg/m³	1,000	110	15	5.9	0.39	38	38	**270**
Bromomethane	74-83-9	µg/m³	170	--	3.9 U	3.9 U	0.98	1.2 U	1.2 U	3.2 U
Butanal	--	µg/m³	--	--	29 U	29 U	2.9 U	5.6	4.4 U	12 U
Carbon disulfide	75-15-0	µg/m³	23,000	--	62 U	62 U	6.2 U	24	23	970 ve
Chlorobenzene	108-90-7	µg/m³	1,700	--	4.6 U	4.6 U	0.46 U	0.69 U	0.69 U	2.2
Chlorodifluoromethane	75-45-6	µg/m³	1,700,000	--	3.5 U	3.5 U	1.0	0.53 U	0.53 U	1.4 U
Chloroethane	--	µg/m³	--	--	2.6 U	2.6 U	0.26 U	1.4	1.4	1.2
Chloroform	67-66-3	µg/m³	3,300	36	3.1	2.5	0.17	**340**	**310**	**2,700 ve**
Chloromethane	74-87-3	µg/m³	3,000	--	9.9	8.5	1.3	12	12	12
cis-1,2-Dichloroethene	--	µg/m³	--	--	4 U	4 U	0.4 U	0.59 U	0.59 U	7.5
Cyclohexane	--	µg/m³	--	--	69 U	69 U	6.9 U	24	22	380
Cyclopentane	287-92-3	µg/m³	--	--	15	61	0.29 U	14	15	110

Table 1
Summary of Soil Gas Data for Taylor Way Property

				Sample ID	Loc 9	Loc 12	Ambient	Loc 9	Loc 109[1]	Loc 16
				Sample Location	Building A	Building A	Ambient	Building A	Building A	Building B
				Sample Date	4/18/2018	4/18/2018	5/8/2018	5/8/2018	5/8/2018	5/8/2018
Analyte	CAS No.	Units	Sub Slab Method C Non Cancer	Sub Slab Method C Cancer						
Volatiles by TO-15 (cont.)										
Dibromochloromethane	124-48-1	µg/m³	--	31	0.85 U	0.85 U	0.085 U	0.13 U	0.13 U	0.99
Dichlorodifluoromethane	75-71-8	µg/m³	3,300	--	200	490	2.8	76	87	2.8
Ethanol	--	µg/m³	--	--	75 U	75 U	7.5 U	11 U	11 U	100
Ethylbenzene	100-41-4	µg/m³	33,000	--	4.3 U	4.3 U	0.43 U	12	15	62
Hexachlorobutadiene	87-68-3	µg/m³	--	38	2.1 U	2.1 U	0.21 U	0.32 U	0.32 U	2.9
Hexanal	--	µg/m³	--	--	41 U	41 U	4.1 U	6.6	6.2	76
Hexane	110-54-3	µg/m³	23,000	--	43	49	3.5 U	93	78	680
Isobutene	115-11-7	µg/m³	--	--	440	540	0.92 U	480 ve	520 ve	2,100 ve
Isoprene	78-79-5	µg/m³	--	--	2.8 U	7	0.28 U	11	11	69
m,p-Xylene	--	µg/m³	--	--	8.7 U	8.7 U	0.87 U	28	40	200
Naphthalene	91-20-3	µg/m³	100	25	1 U	1 U	0.16 fb	0.79	1.9	**65**
o-Xylene	95-47-6	µg/m³	3,300	--	4.3 U	4.3 U	0.43 U	11	15	84
Pentane	109-66-0	µg/m³	--	--	150	270	3 U	210	210	890 ve
Propene	115-07-1	µg/m³	--	--	770	1,700 ve	1.7 U	670 ve	870 ve	2,100 ve
Styrene	100-42-5	µg/m³	33,000	--	8.5 U	8.5 U	0.85 U	2.1	3.6	13
Tetrachloroethene	127-18-4	µg/m³	1,333	3,205	6.8 U	6.8 U	0.68 U	3.5	4.0	3.1
Toluene	108-88-3	µg/m³	170,000	--	14	5.2	1.0	43	45	510
trans-1,2-Dichloroethene	--	µg/m³	--	--	4 U	4 U	0.4 U	0.59 U	0.59 U	2.0
Trichloroethene	79-01-6	µg/m³	67	210	2.7 U	6.1	0.27 U	0.61	0.58	2.5
Trichlorofluoromethane	75-69-4	µg/m³	23,000	--	470	180	1.4	730 ve	710 ve	5.4
Vinyl chloride	75-01-4	µg/m³	3,300	93	2.6 U	2.6 U	0.26 U	0.38 U	0.38 U	8.9

Notes:

-- Not applicable.

RED Detected concentration that exceeds criteria.

1 Loc 109 is a field duplicate of Loc 9 collected on 5/8/2018.

Abbreviations:

CAS Chemical Abstracts Service

µg/m³ Micrograms per cubic meter

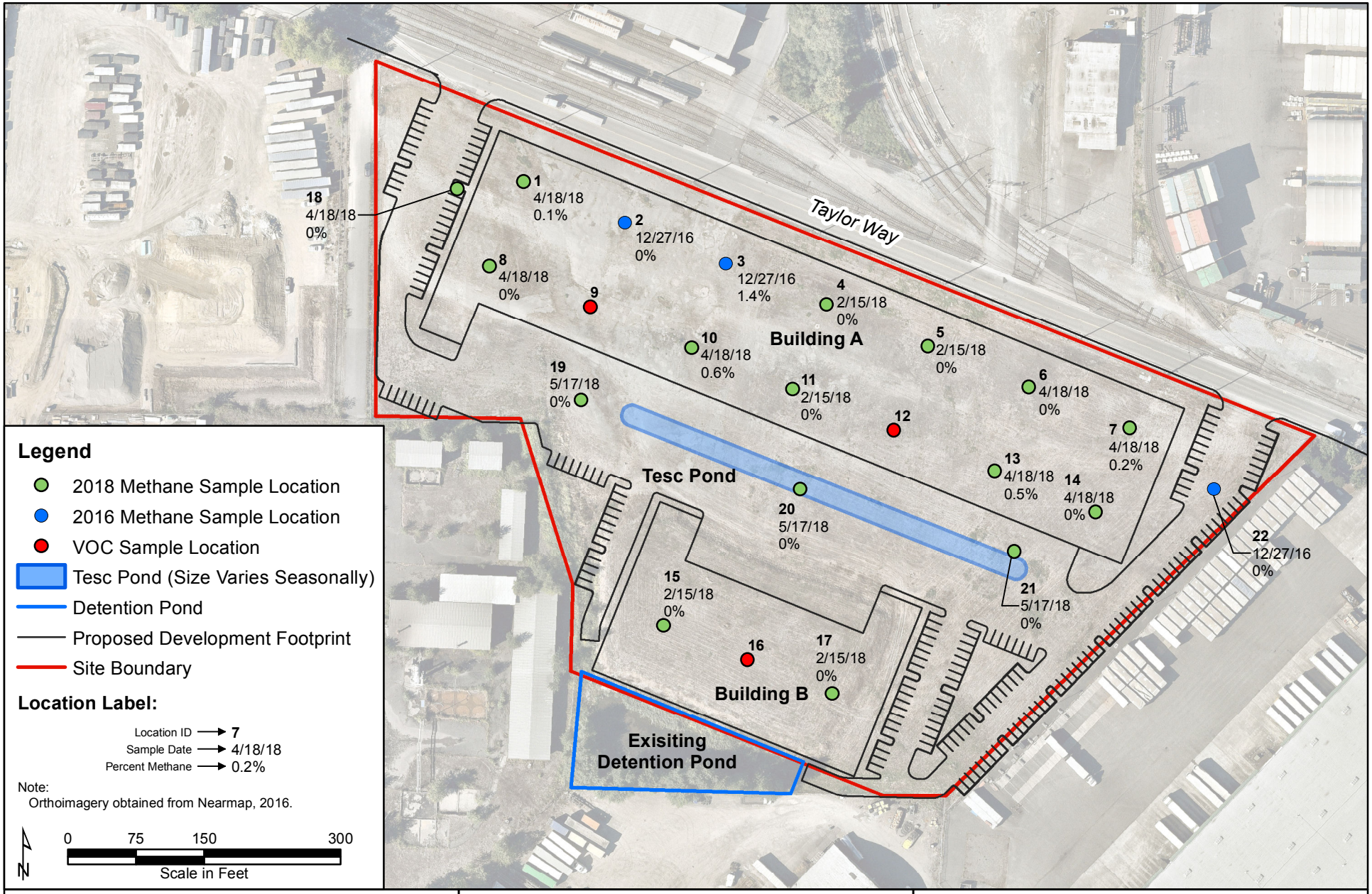
Qualifiers:

fb The analyte was detected in the method blank.

U The analyte was not detected at the given reporting limit.

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

Figure



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Summary of Soil Vapor Survey Data and Vapor Mitigation Plan for the 1514 Taylor Way Site
1514 Taylor Way Development
Tacoma, Washington

Figure 1
Vapor Survey Sample Locations and Methane Results

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6/7/2018

Attachment 1
Lab Report and Field Form

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Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Ambient	Client:	Floyd-Snider
Date Received:	05/10/18	Project:	Ave 55 - Taylor Way, F&BI 805181
Date Collected:	05/08/18	Lab ID:	805181-01
Date Analyzed:	05/14/18	Data File:	051416.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MP

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	79	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	63
APH EC9-12 aliphatics	<35
APH EC9-10 aromatics	<25

DRAFT

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	LOC 09	Client:	Floyd-Snider
Date Received:	05/10/18	Project:	Ave 55 - Taylor Way, F&BI 805181
Date Collected:	05/08/18	Lab ID:	805181-02 1/1.5
Date Analyzed:	05/14/18	Data File:	051417.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MP

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	98	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	3,100 ve
APH EC9-12 aliphatics	1,600
APH EC9-10 aromatics	<37

DRAFT

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	LOC 109	Client:	Floyd-Snider
Date Received:	05/10/18	Project:	Ave 55 - Taylor Way, F&BI 805181
Date Collected:	05/08/18	Lab ID:	805181-03 1/1.5
Date Analyzed:	05/15/18	Data File:	051418.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MP

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	107	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	3,500 ve
APH EC9-12 aliphatics	2,600
APH EC9-10 aromatics	<37

DRAFT

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	LOC 16	Client:	Floyd-Snider
Date Received:	05/10/18	Project:	Ave 55 - Taylor Way, F&BI 805181
Date Collected:	05/08/18	Lab ID:	805181-04 1/4
Date Analyzed:	05/15/18	Data File:	051419.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MP

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	102	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	24,000 ve
APH EC9-12 aliphatics	24,000 ve
APH EC9-10 aromatics	<100

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	Ave 55 - Taylor Way, F&BI 805181
Date Collected:	05/14/18	Lab ID:	08-1000 mb
Date Analyzed:	05/14/18	Data File:	051406.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MP

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	80	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	<46
APH EC9-12 aliphatics	<35
APH EC9-10 aromatics	<25

DRAFT

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Ambient	Client:	Floyd-Snider
Date Received:	05/10/18	Project:	Ave 55 - Taylor Way, F&BI 805181
Date Collected:	05/08/18	Lab ID:	805181-01
Date Analyzed:	05/14/18	Data File:	051416.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MP

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

Compounds:	Concentration ug/m3	Concentration ppbv	Compounds:	Concentration ug/m3	Concentration ppbv
Chlorodifluoromethane	1.0	0.29	1-Butanol	<6.1	<2
Propene	<1.7	<1	Carbon tetrachloride	<0.63	<0.1
Dichlorodifluoromethane	2.8	0.57	Benzene	0.39	0.12
Chloromethane	1.3	0.64	Cyclohexane	<6.9	<2
F-114	<0.7	<0.1	2-Pentanone	<3.5	<1
Isobutene	<0.92	<0.4	3-Pentanone	<3.5	<1
Acetaldehyde	<9	<5	Pentanal	<3.5	<1
Vinyl chloride	<0.26	<0.1	1,2-Dichloropropane	<0.23	<0.05
1,3-Butadiene	0.046	0.021	1,4-Dioxane	<0.36	<0.1
Bromomethane	0.98	0.25	Bromodichloromethane	<0.067	<0.01
Chloroethane	<0.26	<0.1	Trichloroethene	<0.27	<0.05
Ethanol	<7.5	<4	cis-1,3-Dichloropropene	<0.45	<0.1
Acetonitrile	<1.7	<1	4-Methyl-2-pentanone	<4.1	<1
Acrolein	<0.92	<0.4	trans-1,3-Dichloropropene	<0.45	<0.1
Acrylonitrile	<0.22	<0.1	Toluene	1.0	0.27
Pentane	<3	<1	1,1,2-Trichloroethane	<0.055	<0.01
Trichlorofluoromethane	1.4	0.25	3-Hexanone	<4.1	<1
Acetone	8.9	3.8	2-Hexanone	<4.1	<1
2-Propanol	<8.6	<3.5	Hexanal	<4.1	<1
Isoprene	<0.28	<0.1	Tetrachloroethene	<0.68	<0.1
Iodomethane	<0.58	<0.1	Dibromochloromethane	<0.085	<0.01
1,1-Dichloroethene	<0.4	<0.1	1,2-Dibromoethane (EDB)	<0.077	<0.01
Methacrolein	<2.9	<1	Chlorobenzene	<0.46	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1	Ethylbenzene	<0.43	<0.1
Cyclopentane	<0.29	<0.1	1,1,2,2-Tetrachloroethane	<0.14	<0.02
Methyl vinyl ketone	<2.9	<1	m,p-Xylene	<0.87	<0.2
Butanal	<2.9	<1	o-Xylene	<0.43	<0.1
Methylene chloride	<87 ca	<25 ca	Styrene	<0.85	<0.2
CFC-113	<0.77	<0.1	Bromoform	<2.1	<0.2
Carbon disulfide	<6.2	<2	Benzyl chloride	<0.052	<0.01
Methyl t-butyl ether (MTBE)	<1.8	<0.5	1,3,5-Trimethylbenzene	<2.5	<0.5
Vinyl acetate	<7	<2	1,2,4-Trimethylbenzene	<2.5	<0.5
1,1-Dichloroethane	<0.4	<0.1	1,3-Dichlorobenzene	<0.6	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1	1,4-Dichlorobenzene	<0.24	<0.04
Hexane	<3.5	<1	1,2,3-Trimethylbenzene	<2.5	<0.5
Chloroform	0.17	0.034	1,2-Dichlorobenzene	<0.6	<0.1
2-Butanone (MEK)	<2.9	<1	1,2,4-Trichlorobenzene	<0.74	<0.1
1,2-Dichloroethane (EDC)	0.097	0.024	Naphthalene	0.16 fb	0.031 fb
1,1,1-Trichloroethane	<0.55	<0.1	Hexachlorobutadiene	<0.21	<0.02

DRAFT

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	LOC 09	Client:	Floyd-Snider
Date Received:	05/10/18	Project:	Ave 55 - Taylor Way, F&BI 805181
Date Collected:	05/08/18	Lab ID:	805181-02 1/1.5
Date Analyzed:	05/14/18	Data File:	051417.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MP

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	115	70	130

Compounds:	Concentration ug/m3	Concentration ppbv	Compounds:	Concentration ug/m3	Concentration ppbv
Chlorodifluoromethane	<0.53	<0.15	1-Butanol	<9.1	<3
Propene	670 ve	390 ve	Carbon tetrachloride	<0.94	<0.15
Dichlorodifluoromethane	76	15	Benzene	38	12
Chloromethane	12	5.8	Cyclohexane	24	6.9
F-114	<1	<0.15	2-Pentanone	<5.3	<1.5
Isobutene	480 ve	210 ve	3-Pentanone	<5.3	<1.5
Acetaldehyde	52	29	Pentanal	<5.3	<1.5
Vinyl chloride	<0.38	<0.15	1,2-Dichloropropane	2.9	0.62
1,3-Butadiene	<0.033	<0.015	1,4-Dioxane	<0.54	<0.15
Bromomethane	<1.2	<0.3	Bromodichloromethane	<0.1	<0.015
Chloroethane	1.4	0.53	Trichloroethene	0.61	0.11
Ethanol	<11	<6	cis-1,3-Dichloropropene	<0.68	<0.15
Acetonitrile	<2.5	<1.5	4-Methyl-2-pentanone	<6.1	<1.5
Acrolein	<1.4	<0.6	trans-1,3-Dichloropropene	<0.68	<0.15
Acrylonitrile	<0.33	<0.15	Toluene	43	11
Pentane	210	71	1,1,2-Trichloroethane	<0.082	<0.015
Trichlorofluoromethane	730 ve	130 ve	3-Hexanone	<6.1	<1.5
Acetone	110	48	2-Hexanone	<6.1	<1.5
2-Propanol	<13	<5.2	Hexanal	6.6	1.6
Isoprene	11	3.8	Tetrachloroethene	3.5	0.51
Iodomethane	<0.87	<0.15	Dibromochloromethane	<0.13	<0.015
1,1-Dichloroethene	0.76	0.19	1,2-Dibromoethane (EDB)	<0.12	<0.015
Methacrolein	<4.3	<1.5	Chlorobenzene	<0.69	<0.15
trans-1,2-Dichloroethene	<0.59	<0.15	Ethylbenzene	12	2.7
Cyclopentane	14	5.0	1,1,2,2-Tetrachloroethane	<0.21	<0.03
Methyl vinyl ketone	<4.3	<1.5	m,p-Xylene	28	6.5
Butanal	5.6	1.9	o-Xylene	11	2.5
Methylene chloride	<130 ca	<37 ca	Styrene	2.1	0.49
CFC-113	<1.1	<0.15	Bromoform	<3.1	<0.3
Carbon disulfide	24	7.7	Benzyl chloride	<0.078	<0.015
Methyl t-butyl ether (MTBE)	<2.7	<0.75	1,3,5-Trimethylbenzene	5.4	1.1
Vinyl acetate	<11	<3	1,2,4-Trimethylbenzene	6.4	1.3
1,1-Dichloroethane	2.1	0.52	1,3-Dichlorobenzene	2.6	0.43
cis-1,2-Dichloroethene	<0.59	<0.15	1,4-Dichlorobenzene	<0.36	<0.06
Hexane	93	26	1,2,3-Trimethylbenzene	<3.7	<0.75
Chloroform	340	69	1,2-Dichlorobenzene	<0.9	<0.15
2-Butanone (MEK)	6.5	2.2	1,2,4-Trichlorobenzene	<1.1	<0.15
1,2-Dichloroethane (EDC)	2.3	0.58	Naphthalene	0.79	0.15
1,1,1-Trichloroethane	44	8.1	Hexachlorobutadiene	<0.32	<0.03

DRAFT

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	LOC 109	Client:	Floyd-Snider
Date Received:	05/10/18	Project:	Ave 55 - Taylor Way, F&BI 805181
Date Collected:	05/08/18	Lab ID:	805181-03 1/1.5
Date Analyzed:	05/15/18	Data File:	051418.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MP

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	127	70	130

Compounds:	Concentration ug/m3	Concentration ppbv	Compounds:	Concentration ug/m3	Concentration ppbv
Chlorodifluoromethane	<0.53	<0.15	1-Butanol	<9.1	<3
Propene	870 ve	500 ve	Carbon tetrachloride	<0.94	<0.15
Dichlorodifluoromethane	87	18	Benzene	38	12
Chloromethane	12	5.8	Cyclohexane	22	6.5
F-114	<1	<0.15	2-Pentanone	<5.3	<1.5
Isobutene	520 ve	230 ve	3-Pentanone	<5.3	<1.5
Acetaldehyde	62	34	Pentanal	<5.3	<1.5
Vinyl chloride	<0.38	<0.15	1,2-Dichloropropane	2.8	0.60
1,3-Butadiene	<0.033	<0.015	1,4-Dioxane	<0.54	<0.15
Bromomethane	<1.2	<0.3	Bromodichloromethane	<0.1	<0.015
Chloroethane	1.4	0.53	Trichloroethene	0.58	0.11
Ethanol	<11	<6	cis-1,3-Dichloropropene	<0.68	<0.15
Acetonitrile	<2.5	<1.5	4-Methyl-2-pentanone	<6.1	<1.5
Acrolein	<1.4	<0.6	trans-1,3-Dichloropropene	<0.68	<0.15
Acrylonitrile	<0.33	<0.15	Toluene	45	12
Pentane	210	72	1,1,2-Trichloroethane	<0.082	<0.015
Trichlorofluoromethane	710 ve	130 ve	3-Hexanone	<6.1	<1.5
Acetone	110	46	2-Hexanone	<6.1	<1.5
2-Propanol	<13	<5.2	Hexanal	6.2	1.5
Isoprene	11	3.9	Tetrachloroethene	4.0	0.58
Iodomethane	<0.87	<0.15	Dibromochloromethane	<0.13	<0.015
1,1-Dichloroethene	0.76	0.19	1,2-Dibromoethane (EDB)	<0.12	<0.015
Methacrolein	<4.3	<1.5	Chlorobenzene	<0.69	<0.15
trans-1,2-Dichloroethene	<0.59	<0.15	Ethylbenzene	15	3.4
Cyclopentane	15	5.3	1,1,2,2-Tetrachloroethane	<0.21	<0.03
Methyl vinyl ketone	<4.3	<1.5	m,p-Xylene	40	9.2
Butanal	<4.4	<1.5	o-Xylene	15	3.4
Methylene chloride	<130 ca	<37 ca	Styrene	3.6	0.83
CFC-113	<1.1	<0.15	Bromoform	<3.1	<0.3
Carbon disulfide	23	7.5	Benzyl chloride	<0.078	<0.015
Methyl t-butyl ether (MTBE)	<2.7	<0.75	1,3,5-Trimethylbenzene	9.2	1.9
Vinyl acetate	<11	<3	1,2,4-Trimethylbenzene	13	2.7
1,1-Dichloroethane	2.1	0.51	1,3-Dichlorobenzene	1.2	0.19
cis-1,2-Dichloroethene	<0.59	<0.15	1,4-Dichlorobenzene	<0.36	<0.06
Hexane	78	22	1,2,3-Trimethylbenzene	7.3	1.5
Chloroform	310	64	1,2-Dichlorobenzene	<0.9	<0.15
2-Butanone (MEK)	7.2	2.4	1,2,4-Trichlorobenzene	<1.1	<0.15
1,2-Dichloroethane (EDC)	2.3	0.57	Naphthalene	1.9	0.37
1,1,1-Trichloroethane	45	8.2	Hexachlorobutadiene	<0.32	<0.03

DRAFT

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	LOC 16	Client:	Floyd-Snider
Date Received:	05/10/18	Project:	Ave 55 - Taylor Way, F&BI 805181
Date Collected:	05/08/18	Lab ID:	805181-04 1/4
Date Analyzed:	05/15/18	Data File:	051419.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MP

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	121	70	130

Compounds:	Concentration ug/m3	Concentration ppbv	Compounds:	Concentration ug/m3	Concentration ppbv
Chlorodifluoromethane	<1.4	<0.4	1-Butanol	<24	<8
Propene	3,100 ve	1,800 ve	Carbon tetrachloride	<2.5	<0.4
Dichlorodifluoromethane	2.8	0.56	Benzene	270	85
Chloromethane	12	5.6	Cyclohexane	380	110
F-114	<2.8	<0.4	2-Pentanone	<14	<4
Isobutene	2,100 ve	910 ve	3-Pentanone	<14	<4
Acetaldehyde	330	180	Pentanal	<14	<4
Vinyl chloride	8.9	3.5	1,2-Dichloropropane	<0.92	<0.2
1,3-Butadiene	<0.088	<0.04	1,4-Dioxane	<1.4	<0.4
Bromomethane	<3.2	<0.8	Bromodichloromethane	<0.27	<0.04
Chloroethane	1.2	0.44	Trichloroethene	2.5	0.47
Ethanol	100	53	cis-1,3-Dichloropropene	<1.8	<0.4
Acetonitrile	<6.7	<4	4-Methyl-2-pentanone	<16	<4
Acrolein	<3.7	<1.6	trans-1,3-Dichloropropene	<1.8	<0.4
Acrylonitrile	<0.87	<0.4	Toluene	510	140
Pentane	890 ve	300 ve	1,1,2-Trichloroethane	<0.22	<0.04
Trichlorofluoromethane	5.4	0.97	3-Hexanone	<16	<4
Acetone	290	120	2-Hexanone	<16	<4
2-Propanol	290	120	Hexanal	76	19
Isoprene	69	25	Tetrachloroethene	3.1	0.46
Iodomethane	<2.3	<0.4	Dibromochloromethane	0.99	0.12
1,1-Dichloroethene	<1.6	<0.4	1,2-Dibromoethane (EDB)	0.77 fb	0.10 fb
Methacrolein	<11	<4	Chlorobenzene	2.2	0.49
trans-1,2-Dichloroethene	2.0	0.49	Ethylbenzene	62	14
Cyclopentane	110	39	1,1,2,2-Tetrachloroethane	2.1	0.30
Methyl vinyl ketone	<11	<4	m,p-Xylene	200	46
Butanal	<12	<4	o-Xylene	84	19
Methylene chloride	<350 ca	<100 ca	Styrene	13	3.0
CFC-113	<3.1	<0.4	Bromoform	<8.3	<0.8
Carbon disulfide	970 ve	310 ve	Benzyl chloride	<0.21	<0.04
Methyl t-butyl ether (MTBE)	<7.2	<2	1,3,5-Trimethylbenzene	69	14
Vinyl acetate	<28	<8	1,2,4-Trimethylbenzene	120	25
1,1-Dichloroethane	<1.6	<0.4	1,3-Dichlorobenzene	11	1.8
cis-1,2-Dichloroethene	7.5	1.9	1,4-Dichlorobenzene	1.6 fb	0.26 fb
Hexane	680	190	1,2,3-Trimethylbenzene	66	13
Chloroform	2,700 ve	560 ve	1,2-Dichlorobenzene	<2.4	<0.4
2-Butanone (MEK)	65	22	1,2,4-Trichlorobenzene	<3	<0.4
1,2-Dichloroethane (EDC)	0.79	0.20	Naphthalene	65	12
1,1,1-Trichloroethane	<2.2	<0.4	Hexachlorobutadiene	2.9	0.28

DRAFT

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	Ave 55 - Taylor Way, F&BI 805181
Date Collected:	05/14/18	Lab ID:	08-1000 mb
Date Analyzed:	05/14/18	Data File:	051406.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MP

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	94	70	130

Compounds:	Concentration ug/m3	Concentration ppbv	Compounds:	Concentration ug/m3	Concentration ppbv
Chlorodifluoromethane	<0.35	<0.1	1-Butanol	<6.1	<2
Propene	<1.7	<1	Carbon tetrachloride	<0.63	<0.1
Dichlorodifluoromethane	<0.49	<0.1	Benzene	<0.32	<0.1
Chloromethane	<0.21	<0.1	Cyclohexane	<6.9	<2
F-114	<0.7	<0.1	2-Pentanone	<3.5	<1
Isobutene	<0.92	<0.4	3-Pentanone	<3.5	<1
Acetaldehyde	<9	<5	Pentanal	<3.5	<1
Vinyl chloride	<0.26	<0.1	1,2-Dichloropropane	<0.23	<0.05
1,3-Butadiene	<0.022	<0.01	1,4-Dioxane	<0.36	<0.1
Bromomethane	<0.78	<0.2	Bromodichloromethane	<0.067	<0.01
Chloroethane	<0.26	<0.1	Trichloroethene	<0.27	<0.05
Ethanol	<7.5	<4	cis-1,3-Dichloropropene	<0.45	<0.1
Acetonitrile	<1.7	<1	4-Methyl-2-pentanone	<4.1	<1
Acrolein	<0.92	<0.4	trans-1,3-Dichloropropene	<0.45	<0.1
Acrylonitrile	<0.22	<0.1	Toluene	<0.38	<0.1
Pentane	<3	<1	1,1,2-Trichloroethane	<0.055	<0.01
Trichlorofluoromethane	<0.56	<0.1	3-Hexanone	<4.1	<1
Acetone	<4.8	<2	2-Hexanone	<4.1	<1
2-Propanol	<8.6	<3.5	Hexanal	<4.1	<1
Isoprene	<0.28	<0.1	Tetrachloroethene	<0.68	<0.1
Iodomethane	<0.58	<0.1	Dibromochloromethane	<0.085	<0.01
1,1-Dichloroethene	<0.4	<0.1	1,2-Dibromoethane (EDB)	<0.077	<0.01
Methacrolein	<2.9	<1	Chlorobenzene	<0.46	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1	Ethylbenzene	<0.43	<0.1
Cyclopentane	<0.29	<0.1	1,1,2,2-Tetrachloroethane	<0.14	<0.02
Methyl vinyl ketone	<2.9	<1	m,p-Xylene	<0.87	<0.2
Butanal	<2.9	<1	o-Xylene	<0.43	<0.1
Methylene chloride	<87 ca	<25 ca	Styrene	<0.85	<0.2
CFC-113	<0.77	<0.1	Bromoform	<2.1	<0.2
Carbon disulfide	<6.2	<2	Benzyl chloride	<0.052	<0.01
Methyl t-butyl ether (MTBE)	<1.8	<0.5	1,3,5-Trimethylbenzene	<2.5	<0.5
Vinyl acetate	<7	<2	1,2,4-Trimethylbenzene	<2.5	<0.5
1,1-Dichloroethane	<0.4	<0.1	1,3-Dichlorobenzene	<0.6	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1	1,4-Dichlorobenzene	<0.24	<0.04
Hexane	<3.5	<1	1,2,3-Trimethylbenzene	<2.5	<0.5
Chloroform	<0.049	<0.01	1,2-Dichlorobenzene	<0.6	<0.1
2-Butanone (MEK)	<2.9	<1	1,2,4-Trichlorobenzene	<0.74	<0.1
1,2-Dichloroethane (EDC)	<0.04	<0.01	Naphthalene	0.13 lc	0.025 lc
1,1,1-Trichloroethane	<0.55	<0.1	Hexachlorobutadiene	<0.21	<0.02

605181

SAMPLE CHAIN OF CUSTODY

ME 05/10/18

Page # 1 of 1

Report To Tom Colligan
Company Floyd Snider
Address 601 Union St, Ste 600
City, State, ZIP Seattle, WA 98101
Phone 206-292-2078 Email tom.colligan@floydsnider.com

SAMPLERS (*signature*)

PROJECT NAME: Arc 55 - Taylor Way

PO #

REPORTING LEVEL
- ☐ Indoor Air
- ☐ Deep Soil Gas
- ☒ Sub Slab/Soil Gas
- ☐ SVE/Grab

INVOICE TO

TURNAROUND TIME
- ☒ Standard
- ☐ RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- ☒ Dispose after 30 days
- ☐ Archive Samples
- ☐ Other

ANALYSIS REQUESTED

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 (SIR & APP)		Notes
AMBIENT	01	23229	4hr	5/8/18	30	0934	8	1254			X		no He detection
LOC 09	02	~~2435~~ 2436	109	↓	30	1133	3	1142			X		
LOC 109	03	3674	231		30	~~1158~~ 1202	3	1209			X		
LOC 16	04	~~2436~~ 2435	111		30	1220	21	1235			X		
													Samples received at 17 °C

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Kristin Anderson	F5	5/9/18	0930
Received by:	Elizabeth Webber-Bz	FSBI	5/10/18	1045
Relinquished by:				
Received by:				

FORMS\COC\COCTO-15.DOC

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
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fbi@isomedia.com
www.friedmanandbruya.com

April 30, 2018

Tom Colligan, Project Manager
Floyd-Snider
Two Union Square, Suite 600
601 Union St
Seattle, WA 98101

Dear Mr Colligan:

Included are the results from the testing of material submitted on April 19, 2018 from the Ave 55 - Taylor Way, F&BI 804329 project. There are 13 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
c: Kristin Anderson
FDS0430R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on April 19, 2018 by Friedman & Bruya, Inc. from the Floyd-Snider Ave 55 - Taylor Way, F&BI 804329 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Floyd-Snider
804329 -01	Loc 12
804329 -02	Loc 16
804329 -03	Loc 9

Water was present in sample Loc 16. The analysis was placed on hold.

The TO-15 propene concentration in sample Loc 12 exceeded the calibration range of the instrument. The data were flagged accordingly.

All other quality control requirements were acceptable.

Date of Report: 04/30/18
Date Received: 04/19/18
Project: Ave 55 - Taylor Way, F&BI 804329
Date Extracted: 04/27/18
Date Analyzed: 04/27/18

RESULTS FROM THE ANALYSIS OF AIR SAMPLES FOR HELIUM USING METHOD ASTM D1946

Results Reported as % Helium

Sample ID Laboratory ID	Helium
Loc 12 804329-01	<0.6
Loc 16 804329-03	1.1
Method Blank	<0.6

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Loc 12	Client:	Floyd-Snider
Date Received:	04/19/18	Project:	Ave 55 - Taylor Way, F&BI 804329
Date Collected:	04/18/18	Lab ID:	804329-01 1/10
Date Analyzed:	04/25/18	Data File:	042510.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MP

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	94	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	2,200
APH EC9-12 aliphatics	380
APH EC9-10 aromatics	<250

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Loc 9	Client:	Floyd-Snider
Date Received:	04/19/18	Project:	Ave 55 - Taylor Way, F&BI 804329
Date Collected:	04/18/18	Lab ID:	804329-03 1/10
Date Analyzed:	04/25/18	Data File:	042511.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MP

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

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	1,500
APH EC9-12 aliphatics	510
APH EC9-10 aromatics	<250

Analysis For Volatile Compounds By Method MA-APH

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	Ave 55 - Taylor Way, F&BI 804329
Date Collected:	Not Applicable	Lab ID:	08-0846 mb
Date Analyzed:	04/25/18	Data File:	042509.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MP

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	94	70	130

Compounds:	Concentration ug/m3
APH EC5-8 aliphatics	<46
APH EC9-12 aliphatics	<35
APH EC9-10 aromatics	<25

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Loc 12	Client:	Floyd-Snider
Date Received:	04/19/18	Project:	Ave 55 - Taylor Way, F&BI 804329
Date Collected:	04/18/18	Lab ID:	804329-01 1/10
Date Analyzed:	04/25/18	Data File:	042510.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MP

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

Compounds:	Concentration ug/m3	Concentration ppbv	Compounds:	Concentration ug/m3	Concentration ppbv
Chlorodifluoromethane	<3.5	<1	1-Butanol	<61	<20
Propene	1,700 ve	1,000 ve	Carbon tetrachloride	<6.3	<1
Dichlorodifluoromethane	490	100	Benzene	5.9	1.8
Chloromethane	8.5	4.1	Cyclohexane	<69	<20
F-114	<7	<1	2-Pentanone	<35	<10
Isobutene	540	240	3-Pentanone	<35	<10
Acetaldehyde	<90	<50	Pentanal	<35	<10
Vinyl chloride	<2.6	<1	1,2-Dichloropropane	<2.3	<0.5
1,3-Butadiene	<0.22	<0.1	1,4-Dioxane	<3.6	<1
Bromomethane	<3.9	<1	Bromodichloromethane	<0.67	<0.1
Chloroethane	<2.6	<1	Trichloroethene	6.1	1.1
Ethanol	<75	<40	cis-1,3-Dichloropropene	<4.5	<1
Acetonitrile	<17	<10	4-Methyl-2-pentanone	<41	<10
Acrolein	<9.2	<4	trans-1,3-Dichloropropene	<4.5	<1
Acrylonitrile	<2.2	<1	Toluene	5.2	1.4
Pentane	270	92	1,1,2-Trichloroethane	<0.55	<0.1
Trichlorofluoromethane	180	32	3-Hexanone	<41	<10
Acetone	190	79	2-Hexanone	<41	<10
2-Propanol	<86	<35	Hexanal	<41	<10
Isoprene	7.0	2.5	Tetrachloroethene	<6.8	<1
Iodomethane	<5.8	<1	Dibromochloromethane	<0.85	<0.1
1,1-Dichloroethene	<4	<1	1,2-Dibromoethane (EDB)	<0.77	<0.1
Methacrolein	<29	<10	Chlorobenzene	<4.6	<1
trans-1,2-Dichloroethene	<4	<1	Ethylbenzene	<4.3	<1
Cyclopentane	61	21	1,1,2,2-Tetrachloroethane	<1.4	<0.2
Methyl vinyl ketone	<29	<10	m,p-Xylene	<8.7	<2
Butanal	<29	<10	o-Xylene	<4.3	<1
Methylene chloride	<870	<250	Styrene	<8.5	<2
CFC-113	<7.7	<1	Bromoform	<21	<2
Carbon disulfide	<62	<20	Benzyl chloride	<0.52	<0.1
Methyl t-butyl ether (MTBE)	<18	<5	1,3,5-Trimethylbenzene	<25	<5
Vinyl acetate	<70	<20	1,2,4-Trimethylbenzene	<25	<5
1,1-Dichloroethane	5.0	1.2	1,3-Dichlorobenzene	<6	<1
cis-1,2-Dichloroethene	<4	<1	1,4-Dichlorobenzene	<2.4	<0.4
Hexane	49	14	1,2,3-Trimethylbenzene	<25	<5
Chloroform	2.5	0.52	1,2-Dichlorobenzene	<6	<1
2-Butanone (MEK)	<29	<10	1,2,4-Trichlorobenzene	<7.4	<1
1,2-Dichloroethane (EDC)	0.97	0.24	Naphthalene	<1	<0.2
1,1,1-Trichloroethane	13	2.4	Hexachlorobutadiene	<2.1	<0.2

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Loc 9	Client:	Floyd-Snider
Date Received:	04/19/18	Project:	Ave 55 - Taylor Way, F&BI 804329
Date Collected:	04/18/18	Lab ID:	804329-03 1/10
Date Analyzed:	04/25/18	Data File:	042511.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MP

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	92	70	130

Compounds:	Concentration ug/m3	Concentration ppbv	Compounds:	Concentration ug/m3	Concentration ppbv
Chlorodifluoromethane	<3.5	<1	1-Butanol	<61	<20
Propene	770	450	Carbon tetrachloride	<6.3	<1
Dichlorodifluoromethane	200	40	Benzene	15	4.8
Chloromethane	9.9	4.8	Cyclohexane	<69	<20
F-114	<7	<1	2-Pentanone	<35	<10
Isobutene	440	190	3-Pentanone	<35	<10
Acetaldehyde	<90	<50	Pentanal	<35	<10
Vinyl chloride	<2.6	<1	1,2-Dichloropropane	<2.3	<0.5
1,3-Butadiene	<0.22	<0.1	1,4-Dioxane	<3.6	<1
Bromomethane	<3.9	<1	Bromodichloromethane	<0.67	<0.1
Chloroethane	<2.6	<1	Trichloroethene	<2.7	<0.5
Ethanol	<75	<40	cis-1,3-Dichloropropene	<4.5	<1
Acetonitrile	<17	<10	4-Methyl-2-pentanone	<41	<10
Acrolein	<9.2	<4	trans-1,3-Dichloropropene	<4.5	<1
Acrylonitrile	<2.2	<1	Toluene	14	3.7
Pentane	150	50	1,1,2-Trichloroethane	<0.55	<0.1
Trichlorofluoromethane	470	83	3-Hexanone	<41	<10
Acetone	<48	<20	2-Hexanone	<41	<10
2-Propanol	<86	<35	Hexanal	<41	<10
Isoprene	<2.8	<1	Tetrachloroethene	<6.8	<1
Iodomethane	<5.8	<1	Dibromochloromethane	<0.85	<0.1
1,1-Dichloroethene	<4	<1	1,2-Dibromoethane (EDB)	<0.77	<0.1
Methacrolein	<29	<10	Chlorobenzene	<4.6	<1
trans-1,2-Dichloroethene	<4	<1	Ethylbenzene	<4.3	<1
Cyclopentane	15	5.4	1,1,2,2-Tetrachloroethane	<1.4	<0.2
Methyl vinyl ketone	<29	<10	m,p-Xylene	<8.7	<2
Butanal	<29	<10	o-Xylene	<4.3	<1
Methylene chloride	<870	<250	Styrene	<8.5	<2
CFC-113	<7.7	<1	Bromoform	<21	<2
Carbon disulfide	<62	<20	Benzyl chloride	<0.52	<0.1
Methyl t-butyl ether (MTBE)	<18	<5	1,3,5-Trimethylbenzene	<25	<5
Vinyl acetate	<70	<20	1,2,4-Trimethylbenzene	<25	<5
1,1-Dichloroethane	<4	<1	1,3-Dichlorobenzene	25	4.1
cis-1,2-Dichloroethene	<4	<1	1,4-Dichlorobenzene	<2.4	<0.4
Hexane	43	12	1,2,3-Trimethylbenzene	<25	<5
Chloroform	3.1	0.63	1,2-Dichlorobenzene	<6	<1
2-Butanone (MEK)	<29	<10	1,2,4-Trichlorobenzene	<7.4	<1
1,2-Dichloroethane (EDC)	0.73	0.18	Naphthalene	<1	<0.2
1,1,1-Trichloroethane	24	4.5	Hexachlorobutadiene	<2.1	<0.2

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	Floyd-Snider
Date Received:	Not Applicable	Project:	Ave 55 - Taylor Way, F&BI 804329
Date Collected:	Not Applicable	Lab ID:	08-0846 mb
Date Analyzed:	04/25/18	Data File:	042509.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MP

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

Compounds:	Concentration ug/m3	Concentration ppbv	Compounds:	Concentration ug/m3	Concentration ppbv
Chlorodifluoromethane	<0.35	<0.1	1-Butanol	<6.1	<2
Propene	<0.69	<0.4	Carbon tetrachloride	<0.63	<0.1
Dichlorodifluoromethane	<0.49	<0.1	Benzene	<0.32	<0.1
Chloromethane	<0.21	<0.1	Cyclohexane	<6.9	<2
F-114	<0.7	<0.1	2-Pentanone	<3.5	<1
Isobutene	<0.92	<0.4	3-Pentanone	<3.5	<1
Acetaldehyde	<9	<5	Pentanal	<3.5	<1
Vinyl chloride	<0.26	<0.1	1,2-Dichloropropane	<0.23	<0.05
1,3-Butadiene	<0.022	<0.01	1,4-Dioxane	<0.36	<0.1
Bromomethane	<0.39	<0.1	Bromodichloromethane	<0.067	<0.01
Chloroethane	<0.26	<0.1	Trichloroethene	<0.27	<0.05
Ethanol	<7.5	<4	cis-1,3-Dichloropropene	<0.45	<0.1
Acetonitrile	<1.7	<1	4-Methyl-2-pentanone	<4.1	<1
Acrolein	<0.92	<0.4	trans-1,3-Dichloropropene	<0.45	<0.1
Acrylonitrile	<0.22	<0.1	Toluene	<0.38	<0.1
Pentane	<3	<1	1,1,2-Trichloroethane	<0.055	<0.01
Trichlorofluoromethane	<0.56	<0.1	3-Hexanone	<4.1	<1
Acetone	<4.8	<2	2-Hexanone	<4.1	<1
2-Propanol	<8.6	<3.5	Hexanal	<4.1	<1
Isoprene	<0.28	<0.1	Tetrachloroethene	<0.68	<0.1
Iodomethane	<0.58	<0.1	Dibromochloromethane	<0.085	<0.01
1,1-Dichloroethene	<0.4	<0.1	1,2-Dibromoethane (EDB)	<0.077	<0.01
Methacrolein	<2.9	<1	Chlorobenzene	<0.46	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1	Ethylbenzene	<0.43	<0.1
Cyclopentane	<0.29	<0.1	1,1,2,2-Tetrachloroethane	<0.14	<0.02
Methyl vinyl ketone	<2.9	<1	m,p-Xylene	<0.87	<0.2
Butanal	<2.9	<1	o-Xylene	<0.43	<0.1
Methylene chloride	<87	<25	Styrene	<0.85	<0.2
CFC-113	<0.77	<0.1	Bromoform	<2.1	<0.2
Carbon disulfide	<6.2	<2	Benzyl chloride	<0.052	<0.01
Methyl t-butyl ether (MTBE)	<1.8	<0.5	1,3,5-Trimethylbenzene	<2.5	<0.5
Vinyl acetate	<7	<2	1,2,4-Trimethylbenzene	<2.5	<0.5
1,1-Dichloroethane	<0.4	<0.1	1,3-Dichlorobenzene	<0.6	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1	1,4-Dichlorobenzene	<0.24	<0.04
Hexane	<3.5	<1	1,2,3-Trimethylbenzene	<2.5	<0.5
Chloroform	<0.049	<0.01	1,2-Dichlorobenzene	<0.6	<0.1
2-Butanone (MEK)	<2.9	<1	1,2,4-Trichlorobenzene	<0.74	<0.1
1,2-Dichloroethane (EDC)	<0.04	<0.01	Naphthalene	<0.1	<0.02
1,1,1-Trichloroethane	<0.55	<0.1	Hexachlorobutadiene	<0.21	<0.02

Date of Report: 04/30/18
Date Received: 04/19/18
Project: Ave 55 - Taylor Way, F&BI 804329

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR HELIUM USING METHOD ASTM D1946

Laboratory Code: 804329-03 (Duplicate)

Analyte	Sample Result (%)	Duplicate Result (%)	Relative Percent Difference	Acceptance Criteria
Helium	1.1	<0.6	nm	0-50

Date of Report: 04/30/18
Date Received: 04/19/18
Project: Ave 55 - Taylor Way, F&BI 804329

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD APH

Laboratory Code: 804329-03 1/10 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 25)
APH EC5-8 aliphatics	ug/m3	1,500	1,700	12
APH EC9-12 aliphatics	ug/m3	510	550	8
APH EC9-10 aromatics	ug/m3	<250	<250	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
APH EC5-8 aliphatics	ug/m3	230	74	70-130
APH EC9-12 aliphatics	ug/m3	350	97	70-130
APH EC9-10 aromatics	ug/m3	251	80	70-130

Date of Report: 04/30/18
Date Received: 04/19/18
Project: Ave 55 - Taylor Way, F&BI 804329

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
Chlorodifluoromethane	ppbv	10	98	70-130
Propene	ppbv	10	88	70-130
Dichlorodifluoromethane	ppbv	10	98	70-130
Chloromethane	ppbv	10	104	70-130
F-114	ppbv	10	103	70-130
Isobutene	ppbv	10	100	70-130
Acetaldehyde	ppbv	10	97	70-130
Vinyl chloride	ppbv	10	106	70-130
1,3-Butadiene	ppbv	10	104	70-130
Bromomethane	ppbv	10	129	70-130
Chloroethane	ppbv	10	105	70-130
Ethanol	ppbv	10	97	70-130
Acetonitrile	ppbv	10	106	70-130
Acrolein	ppbv	10	98	70-130
Acrylonitrile	ppbv	10	98	70-130
Pentane	ppbv	10	93	70-130
Trichlorofluoromethane	ppbv	10	90	70-130
Acetone	ppbv	10	93	70-130
2-Propanol	ppbv	10	82	70-130
Isoprene	ppbv	10	95	70-130
Iodomethane	ppbv	10	93	70-130
1,1-Dichloroethene	ppbv	10	100	70-130
Methacrolein	ppbv	10	95	70-130
trans-1,2-Dichloroethene	ppbv	10	100	70-130
Cyclopentane	ppbv	10	99	70-130
Methyl Vinyl Ketone	ppbv	10	99	70-130
Butanal	ppbv	10	96	70-130
Methylene chloride	ppbv	10	87	70-130
CFC-113	ppbv	10	96	70-130
Carbon disulfide	ppbv	10	93	70-130
Methyl t-butyl ether	ppbv	10	89	70-130
Vinyl acetate	ppbv	10	77	70-130
1,1-Dichloroethane	ppbv	10	101	70-130
cis-1,2-Dichloroethene	ppbv	10	101	70-130
Hexane	ppbv	10	93	70-130
Chloroform	ppbv	10	103	70-130
2-Butanone (MEK)	ppbv	10	96	70-130
1,2-Dichloroethane (EDC)	ppbv	10	100	70-130
1,1,1-Trichloroethane	ppbv	10	95	70-130
1-Butanol	ppbv	10	84	70-130
Carbon tetrachloride	ppbv	10	89	70-130

Date of Report: 04/30/18
Date Received: 04/19/18
Project: Ave 55 - Taylor Way, F&BI 804329

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

Laboratory Code: Laboratory Control Sample (Continued)

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ppbv	10	103	70-130
Cyclohexane	ppbv	10	95	70-130
2-Pentanone	ppbv	10	95	70-130
3-Pentanone	ppbv	10	106	70-130
Pentanal	ppbv	10	97	70-130
1,2-Dichloropropane	ppbv	10	105	70-130
1,4-Dioxane	ppbv	10	87	70-130
Bromodichloromethane	ppbv	10	104	70-130
Trichloroethene	ppbv	10	102	70-130
cis-1,3-Dichloropropene	ppbv	10	92	70-130
4-Methyl-2-pentanone	ppbv	10	86	70-130
trans-1,3-Dichloropropene	ppbv	10	88	70-130
Toluene	ppbv	10	99	70-130
1,1,2-Trichloroethane	ppbv	10	102	70-130
3-Hexanone	ppbv	10	90	70-130
2-Hexanone	ppbv	10	90	70-130
Hexanal	ppbv	10	93	70-130
Tetrachloroethene	ppbv	10	99	70-130
Dibromochloromethane	ppbv	10	105	70-130
1,2-Dibromoethane (EDB)	ppbv	10	103	70-130
Chlorobenzene	ppbv	10	98	70-130
Ethylbenzene	ppbv	10	100	70-130
1,1,2,2-Tetrachloroethane	ppbv	10	103	70-130
m,p-Xylene	ppbv	20	101	70-130
o-Xylene	ppbv	10	103	70-130
Styrene	ppbv	10	98	70-130
Bromoform	ppbv	10	104	70-130
Benzyl chloride	ppbv	10	81	70-130
1,3,5-Trimethylbenzene	ppbv	10	96	70-130
1,2,4-Trimethylbenzene	ppbv	10	94	70-130
1,3-Dichlorobenzene	ppbv	10	102	70-130
1,4-Dichlorobenzene	ppbv	10	103	70-130
1,2,3-Trimethylbenzene	ppbv	10	96	70-130
1,2-Dichlorobenzene	ppbv	10	102	70-130
1,2,4-Trichlorobenzene	ppbv	10	84	70-130
Naphthalene	ppbv	10	104	70-130
Hexachlorobutadiene	ppbv	10	97	70-130

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.

804329

SAMPLE CHAIN OF CUSTODY HE 04-19-18

Page # 1 of 1

Report To Tom Colligan
Company Floyd Snider
Address 601 Union St, Ste 600
City, State, ZIP Seattle, WA 98101
Phone 206-292-2078 Email tom.colligan@floydsnider.com

SAMPLERS (*signature*)

PROJECT NAME: Arc 55 - Taylor Way

PO #:

REPORTING LEVEL
☐ Indoor Air ☒ Deep Soil Gas
☑ Sub Slab/Soil Gas ☐ SVE/Grab

INVOICE TO:

TURNAROUND TIME
☐ Standard
☒ RUSH 5-day
Rush charges authorized by:

SAMPLE DISPOSAL
☒ Dispose after 30 days
☐ Archive Samples
☐ Other

ANALYSIS REQUESTED

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	~~Helium ASTM D-1946~~	~~TO-15 cVOCs~~ Fac Lor	APH's	Notes
LOC 12	01	2433	18	4/18/18	30	0924	2	0931		X	X	X	He detection for leaks
LOC 16	02	3389	224	4/18/18	30	1621	15	1643		X	X	X	water MS sample pt ~ likely bad sample
LOC 9	03	3672	01	4/18/18	30	1651	2	1659		X	X	X	
													~~Samples received at~~ 20°C

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Kristin Andersen	FS	4/19/18	0830
Received by:	Eric Dow	FSB	4/19/18	0830
Relinquished by:				
Received by:				

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

SOIL VAPOR SAMPLING SHEET

Site Reference: Ave 55 - Taylor Way

Address: 1514 Taylor Way, Tacoma

Date: 4/18/2018 + 5/18/2018

Personnel: K Anderson

	Soil Vapor Sampling Point ID	Vacuum Test: Time Start Vacuum Testing	Vacuum Test: Time Stop Vacuum Testing	Purging: Time Start Purging	Purging: Time Stop Purging	Purging: Purging Rate (ml/min)	Purging: Total Volume Purged (ml)	Helium: Time of Helium Reading	Helium: Helium Reading (%)	Sampling: Time Start Sampling	Sampling: Time Stop Sampling	Sampling: Canister Vacuum Before Sampling (in Hg)	Sampling: Canister Vacuum After Sampling (in Hg)	PID: Time of PID Reading	PID: PID Reading	Lab canister # ~~Notes~~
4/18	LOC 12	4/17@1112	2222	0921	0924	167	500	0924	11.9%	0924	0934	30	2	1042	0.0	# 2433
4/18	LOC 16	4/17@2224	2224	1618	1621	167	500	1621	11.0%	1621	1643	30	15	1618	0.1	# 3389
4/18	LOC 9	4/17@1225	2235	1648	1651	167	500	1651	10.89%	1651	1659	30	2	1649	0.5	# 3672
5/18	LOC 9	1100	1110	1129	1132	167	500	—	—	1133	1142	30	3	1132	1.2	# 2436
5/18	LOC 9 dup	1101	1111	1159	1202	167	500	—	—	1202	1209	30	3	1202	1.3	# 3674
5/18	LOC 16	1059	1109	1217	1220	167	500	—	—	1220	1235	30	21	1220	0.4	# 2435

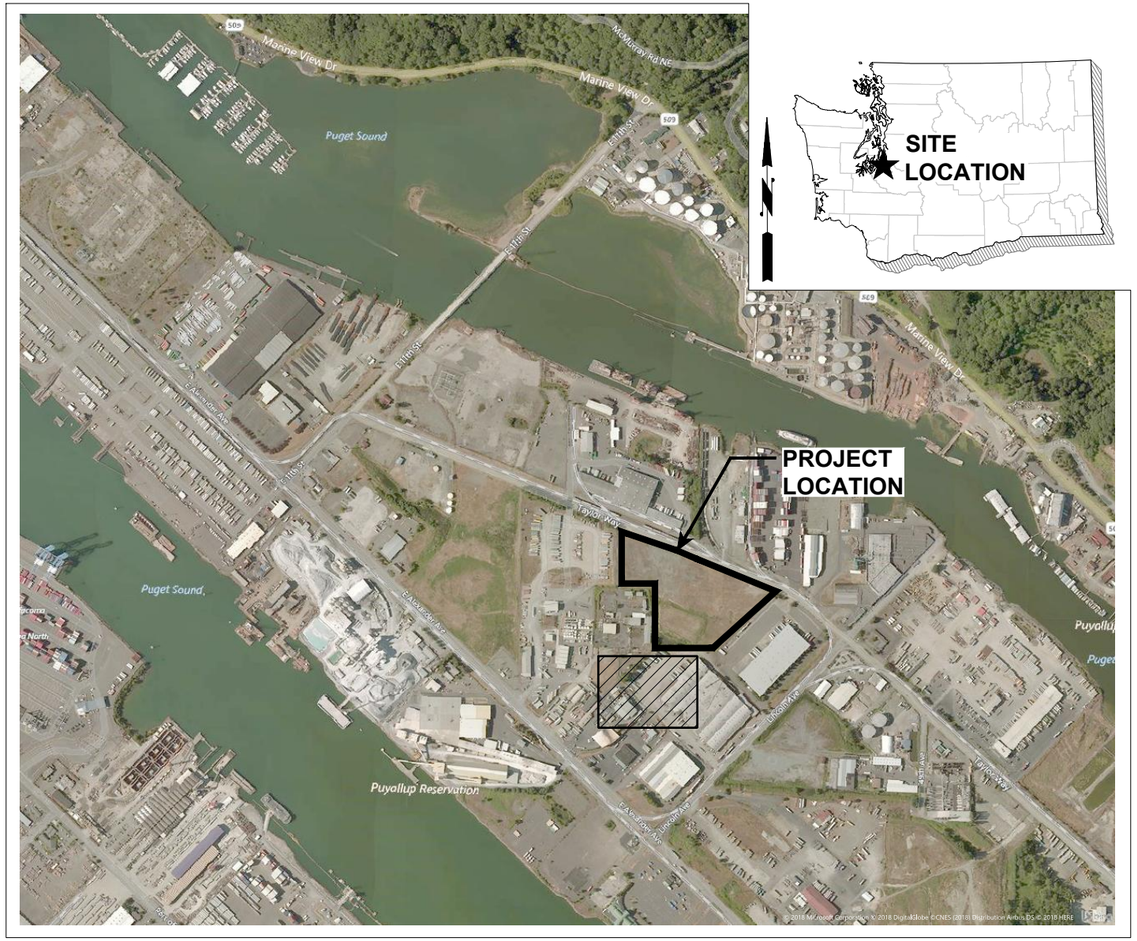
Notes:

1) purge time for 3x volumes 1-2 min. ~~purged 3 min~~ based on 5-10 ft tubing. purged total 3 min
2) encountered water at LOC 16 on 4/18. excessive vacuum @ sample loc + likely water in canister
3) He leak detection test passed on all samples coll. 4/18. per WP no leak test 5/18
4) excessive vacuum at LOC 16 on 5/18. low sample volume.
5) LOC 9 dup labeled LOC 109

Attachment 2
Vapor Mitigation Plans and Field Inspection Reports

AVE 55 TAYLOR AVE METHANE MITIGATION PROJECT

TACOMA, WASHINGTON



VICINITY MAP

SCALE: N.T.S.

SHEET INDEX		
SHEET NO.	DRAWING NO.	DESCRIPTION
1	G-1	COVER SHEET
2	G-2	GENERAL NOTES
3	C-1	BUILDING A
4	C-2	NORTH WEST OFFICE AREA OF BUILDING A
5	C-3	NORTH EAST OFFICE AREA OF BUILDING A
6	C-4	TYPICAL DETAILS
7	C-5	PENETRATION DETAILS

CLIENT:

AVENUE 55
600 UNIVERSITY ST.
SUITE 2305
SEATTLE, WA, 98101
PHONE: 206.707.9696
CONTACT: DREW ZABOROWSKI

GENERAL CONTRACTOR:

SIERRA CONSTRUCTION
19900 144TH AVE NE
WOODENVILLE, WA 98072
PHONE: 425.487.5200
CONTACT: BRYAN PLOETZ

ENGINEER:

MICHAEL SPILLANE
HERRERA ENVIRONMENTAL CONSULTANTS
2200 SIXTH AVENUE
SUITE 1100
SEATTLE, WA 98121
PHONE: 206.441.9080
CONTACT: MICHAEL SPILLANE

1 / C-1 — DETAIL REFERENCE NUMBER; DRAWING ON WHICH DETAIL IS SHOWN

DETAIL (1 / C-1) — SCALE: NTS — DETAIL REFERENCE NUMBER; DRAWING FROM WHICH DETAIL WAS TAKEN

A / C-4 — SECTION REFERENCE LETTER; DRAWING ON WHICH SECTION IS SHOWN

SECTION/PROFILE (A / C-2) — SCALE: NTS — SECTION/PROFILE REFERENCE LETTER; DRAWING FROM WHICH SECTION/PROFILE WAS TAKEN

"-" INDICATES THAT THE DETAIL/SECTION IS SHOWN ON THE SAME SHEET

"TYP" INDICATES THAT THE DETAIL/SECTION IS UNIFORMLY TYPICAL THROUGHOUT PROJECT EXCEPT WHERE OTHERWISE NOTED

"VAR" SPECIFIES THAT DETAIL/SECTION WAS TAKEN FROM VARIOUS DRAWINGS

NOTE AND DETAIL/SECTION REFERENCING

ORIGINATED BY: / DATE: /
CHECKED BY: / DATE: /
BACK-CHECKED BY: / DATE: /
CORRECTED BY: / DATE: /
VERIFIED BY: / DATE: /
O:\proj\Y2016\16-06475-000\CAD\dwg\G-1.dwg | 6/7/2018 1:52 PM | Todd Prescott

BID SET

No.	REVISION	BY	APP'D	DATE

ONE INCH AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

811 Know what's below. Call before you dig.

HERRERA

MICHAEL M. SPILLANE — STATE OF WASHINGTON — 30780 — REGISTERED PROFESSIONAL ENGINEER

DESIGNED: K. JOHNSON	DRAWN: T. PRESCOTT		
DESIGNED: M. SPILLANE	DRAWN: -		
DESIGNED: -	CHECKED: -		
SCALE: AS NOTED	APPROVED: M. SPILLANE		

AVE 55
TAYLOR WAY METHANE MITIGATION

COVER SHEET

DATE: JUNE 2018
PROJECT NO: 16-06475-000
DRAWING NO: G-1
SHEET NO: 1 OF 7

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METHANE MITIGATION SYSTEM NOTES:

GENERAL:

1. A PASSIVE SUBSLAB METHANE BARRIER AND VENTING SYSTEM IS TO BE INSTALLED IN OFFICE LOCATIONS.
2. A FLEXIBLE, IMPERMEABLE, GEOMEMBRANE LINER SHALL BE PLACED BENEATH THE NEW SLAB-ON-GRADE. THE GEOMEMBRANE WILL BE SOLVENT WELDED TO PROVIDE A CONTINUOUS MEMBRANE BARRIER.
3. WHERE GRADE BEAMS OR FOOTINGS PENETRATE THE MEMBRANE, THE MEMBRANE WILL BE PHYSICALLY ATTACHED TO GRADE BEAMS, FOOTINGS, OR WALLS TO SEAL THE LINER TO THE BUILDING USING BATTEN STRIPS.
4. A 2" PVC COLLECTION PIPING WILL BE INSTALLED WITHIN THE DRAINAGE LAYER BELOW THE SLAB.
5. THE COLLECTION PIPING WILL BE ROUTED TO A VENT PIPE DISCHARGING A MINIMUM OF THREE FEET ABOVE THE BUILDING ROOFLINE AS SHOWN ON THE DRAWINGS.
6. PRIOR TO PLACEMENT OF REINFORCING STEEL AND CONCRETE, A NON-WOVEN GEOTEXTILE OR SAND SHALL BE PLACED OVER THE GEOMEMBRANE TO PREVENT PUNCTURE.

COLLECTION GRAVEL LAYER:

1. THE COLLECTION GRAVEL LAYER SHALL CONSIST OF CLEAN, FREE DRAINING GRAVEL OR CRUSHED ROCK WITH LESS THAN 2 PERCENT BY WEIGHT PASSING THE U.S. NO. 200 MESH SIEVE (FINES) BASED ON THE 3/4-INCH MINUS FRACTION.
2. PLACE THE DRAINAGE MATERIAL IN LEVEL LIFTS AND COMPACT TO A DENSE AND UNYIELDING CONDITIONING. SYSTEM DESIGNER SHOULD EVALUATE THE COMPACTION OF THE DRAINAGE MATERIAL PRIOR TO THE PLACEMENT OF VAPOR BARRIERS, REINFORCING STEEL, OR OTHER OBSTRUCTIONS.
3. SUBMIT A SAMPLE OF AND/OR SAMPLE SPECIFICATIONS FOR THE PROPOSED DRAINAGE MATERIAL FOR APPROVAL AT LEAST 1 WEEK BEFORE ANY USE ON SITE.

PERFORATED COLLECTOR PIPES:

1. A SERIES OF PERFORATED PIPES SHALL BE INSTALLED WITHIN THE DRAINAGE LAYER TO COLLECT AND ROUTE METHANE GAS AWAY FROM THE SLAB.
2. EMBED MINIMUM 2" PVC PIPES WITH THE GRAVEL DRAINAGE LAYER BENEATH THE FLOOR SLAB.
3. PLACE THE PERFORATED PIPES FLAT WITH THEIR CROWN LOCATED WITHIN 2 INCHES OF THE BASE OF THE GEOMEMBRANE.
4. THE PIPES SHOULD CONTAIN PERFORATIONS AROUND THE ENTIRE PIPE DIAMETER, OR IF ONLY PARTIALLY PERFORATED, THE PERFORATIONS SHOULD BE ALIGNED TOWARDS THE CRESTS OF THE PIPES FOR METHANE COLLECTION.
5. THE PIPES SHOULD BE LAID OUT SUCH THAT THE LONGEST METHANE GAS TRAVEL PATH IS LESS THAN APPROXIMATELY 75 FEET.
6. PIPING SYSTEMS MUST BE FLAT (NO SLOPE). THE VENT PIPE CONNECTION TO THE HEADER SHALL NOT CONTAIN ANY SAGS (LOW POINTS)

SAND:

1. SAND SHALL BE BUILDING SAND, MINERAL AGGREGATE TYPE 7, PER 9-03-12 (6) CITY OF SEATTLE STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION 2014 EDITION.

GEOMEMBRANE:

1. THE GEOMEMBRANE SHALL BE 30 MIL PVC MEETING THE REQUIREMENTS OF ASTM D-7176 AND THE FOLLOWING:

   FACTORY FABRICATED SEAMS:

   PEEL STRENGTH (LBS/IN, MIN) ASTM D-882,15

   SHEAR STRENGTH (LBS/IN, MIN) ASTM D-882,58.4

   THICKNESS ± 5% ASTM D-5199.030"

   SPECIFIC GRAVITY (MIN) ASTM D-792,1.20

   TENSILE (LB/IN-WIDTH, MIN) ASTM D-882,73
2. THE PVC GEOMEMBRANE MUST EXTEND THE FULL LENGTH (AND WIDTH) OF THE SLAB. THE PVC GEOMEMBRANE SHOULD TIE INTO AN INTERIOR CONCRETE GRADE BEAM OR EXTERIOR FOOTING OR EDGE OF THE SLAB AS SHOWN ON DRAWINGS.
3. THE PVC GEOMEMBRANE SHOULD BE FACTORY SEAMED TO MINIMIZE FIELD SEAMS.
4. ALL FIELD SEAMS MUST BE SOLVENT-WELDED WITH OVERLAPS AS SPECIFIED BY THE PVC MANUFACTURER.
5. ALL SERVICES/UTILITIES THAT NEED TO PENETRATE THE PVC GEOMEMBRANE SHALL BE BOOTED THROUGH THE MEMBRANE TO ENSURE A COMPLETE SEAL AROUND THE SERVICE. SEE DRAWINGS.
6. EACH BOOT WILL BE SOLVENT WELDED.
7. SERVICES PENETRATING THE PVC GEOMEMBRANE MUST BE A MINIMUM OF 6" APART TO PROVIDE ADEQUATE ROOM TO CONSTRUCT THE PIPE BOOT.
8. IT IS PREFERRED THAT ALL ELECTRICAL CONDUITS RUN ON TOP OF THE PVC GEOMEMBRANE. IF SOME ELECTRICAL CONDUITS ARE BELOW THE GEOMEMBRANE, IT IS RECOMMENDED THAT THEY RUN TO THE PERIMETER OF THE SLAB AND ENTER THE BUILDING FROM THE OUTSIDE WALL TO MINIMIZE THE NUMBER OF BOOTS THROUGH THE LINER.
9. FOR PROTECTION AGAINST PUNCTURES OR DAMAGE FROM ABOVE THE LINER, A MINIMUM OF 2 INCHES OF SAND OR NONWOVEN SEPARATION GEOTEXTILE SHALL BE PLACED PRIOR TO INSTALLATION OF UTILITIES OR REBAR REINFORCEMENT FOR THE CONCRETE SLAB. THE GEOMEMBRANE MAY BE PLACED UNDER UTILITIES IN A UTILITY TRENCH WITH A MINIMUM OF 2-INCHES OF SAND ABOVE THE GEOMEMBRANE.

GEOTEXTILE:

1. THE MATERIAL SHALL BE A GEOTEXTILE CONSISTING ONLY OF LONG CHAIN POLYMERIC FIBERS OR YARNS FORMED INTO A STABLE NETWORK SUCH THAT THE FIBERS OR YARNS RETAIN THEIR POSITION RELATIVE TO EACH OTHER DURING HANDLING, PLACEMENT, AND DESIGN SERVICE LIFE. AT LEAST 95 PERCENT BY WEIGHT OF THE MATERIAL SHALL BE POLYOLEFINS OR POLYESTERS.
2. THE MATERIAL SHALL BE FREE FROM DEFECTS OR TEARS. THE GEOTEXTILE SHALL ALSO BE FREE OF ANY TREATMENT OR COATING WHICH MIGHT ADVERSELY ALTER ITS HYDRAULIC OR PHYSICAL PROPERTIES AFTER INSTALLATION.
3. THE GEOTEXTILE SHALL CONFORM TO THE PROPERTIES AS INDICATED IN TABLE 3 FOR SEPARATION - NONWOVEN. PER 9-37.1 GEOTEXTILE AND THREAD FOR SEWING OF THE CITY OF SEATTLE STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION 2014 EDITION.
4. OVERLAP GEOTEXTILE PANELS A MINIMUM OF 12 INCHES.

VENT RISERS:

1. THE PERFORATED COLLECTOR PIPES SHALL BE TIED TO ONE ANOTHER AND CONNECTED TO ONE OR MORE VERTICAL VENT RISERS. VENT RISERS SHALL BE PVC AND NOT BE LARGER IN DIAMETER THAN THE HORIZONTAL COLLECTOR PIPES.
2. 3-INCH DIAMETER RISER REQUIRES 1 RISER FOR EVERY 7,500 SF OF FOOTPRINT (MINIMUM OF 2 RISERS PER OFFICE AREA).
3. RISER PIPES SHALL HAVE A MAXIMUM SPACING AND LENGTH OF 100 FEET.
4. PROVIDE A RAIN GUARD AT THE TOP TERMINUS OF THE VENT RISER THAT DOES NOT RESTRICT THE UPWARD FLOW OF AIR OR METHANE FROM THE PIPE.
5. TERMINATE VENT RISERS AS FOLLOWS:

   10 FEET OR MORE ABOVE GRADE;

   10 FEET OR MORE AWAY FROM ANY WINDOW, DOOR, ROOF HATCH, OPENING, OR AIR INTAKE INTO THE BUILDING;

   3 FEET OR MORE ABOVE HIGHEST POINT IN ROOF WITHIN 10 FEET;

   3 FEET OR MORE AWAY FROM ANY PARAPET;

   4 FEET OR MORE AWAY FROM PROPERTY LINE; AND

   5 FEET OR MORE AWAY FROM ELECTRICAL DEVICES.
6. RISERS SHALL BE LOCATED AWAY FROM ANY LOCATIONS WITH SPARKS OR OPEN FLAME.
7. THE PIPES WILL BE SECURED TO THE BUILDING WALL AND VENTED A MINIMUM OF 3 FEET ABOVE THE EAVE AND A MINIMUM OF 10 FEET AWAY FROM ANY POTENTIAL AIR INTAKE.
8. PIPE USED FOR VENTING SHALL BE SECURED AS SHOWN ON DRAWINGS WITH GALVANIZED UNISTRUT PIPE SUPPORTS AND PIPE CLAMPS.
9. VENT PIPE SHALL BE BOOTED THROUGH EAVE AND ROOF WITH COMPATIBLE ROOFING SYSTEM WATERTIGHT MANUFACTURED BOOT OR ROUTED UP AND OVER THE PARAPET WITHOUT AND POSITIVELY DRAIN WITH A MINIMUM OF 2 PERCENT SLOPE.
10. VENT PIPES SHALL HAVE ISOLATION VALVES INSTALLED TO ALLOW FOR HYDROSTATIC OR PNEUMATIC LEAK TESTING.
11. ALL LEAK TESTING SHALL BE PERFORMED IN THE PRESENCE OF A REPRESENTATIVE OF THE LFG MITIGATION DESIGNER.

UTILITIES:

1. PENETRATIONS THROUGH THE FLOOR SLAB SHALL BE SEALED WITH PIPE COLLARS IN THE SLAB, SO THAT METHANE CANNOT DIRECTLY FLOW FROM THE SUBSLAB GRAVEL LAYER INTO THE INTERIOR OF THE BUILDING.
2. CONDUIT SHALL BE SEALED BETWEEN THE FLOOR SLAB AND THE FIRST JOINT ABOVE THE FLOOR SLAB TO PREVENT TRANSMISSION OF GAS THROUGH THE CONDUIT.

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HERRERA

MICHAEL M. SPILLANE STATE OF WASHINGTON 30780 REGISTERED PROFESSIONAL ENGINEER

DESIGNED: K. JOHNSON	DRAWN: T. PRESCOTT
DESIGNED: M. SPILLANE	DRAWN: -
DESIGNED: -	CHECKED: -
SCALE: AS NOTED	APPROVED: M. SPILLANE

AVE 55
TAYLOR WAY METHANE MITIGATION

GENERAL NOTES

DATE: JUNE 2018
PROJECT NO: 16-06475-000
DRAWING NO: G-2
SHEET NO: 2 OF 7

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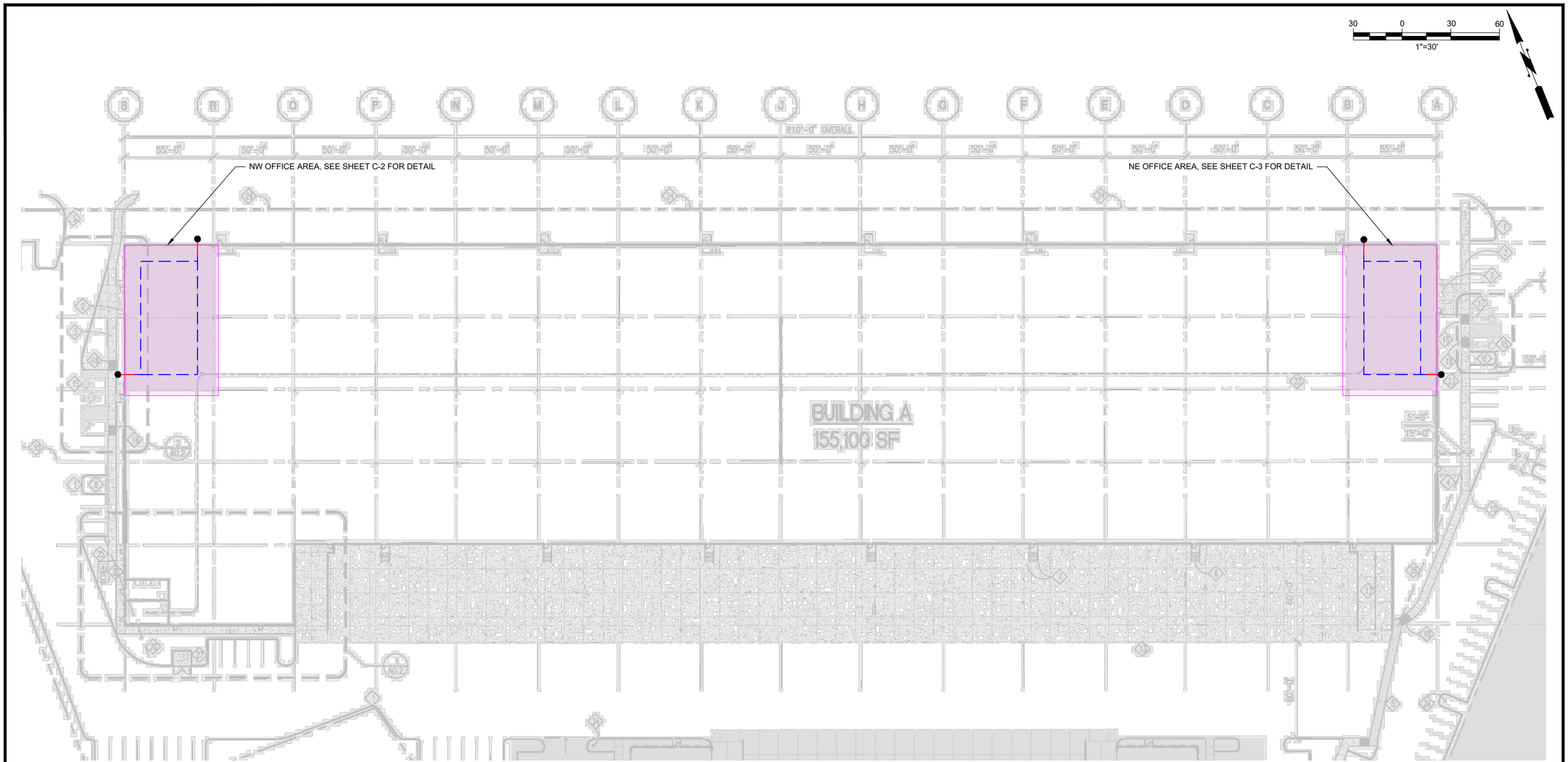

NOTES:

1. 30mil GEOMEMBRANE SHALL BE A CONTINUOUS SHEET UNDER BUILDING SLAB AND SHALL EXTEND TO EXTERIOR EDGE OF PERIMETER FOOTING OR BE SEALED TO FOOTINGS BY BATTEN STRIP.
2. ALL PENETRATIONS THROUGH MEMBRANE SHALL BE BOOTED AND SEALED. SEE DETAILS 1 AND 2/C-5.
3. ALL INTERIOR VENT PIPING MUST BE PRESSURE TESTED USING HYDRO STATIC OR PNEUMATIC METHOD.
4. GRANULAR MATERIAL UNDER SLAB IN PIPE TRENCH SIZED LARGER THAN PERFORATIONS IN PIPE OR ADD GEOTEXTILE WRAP AROUND PERFORATED PIPE.
5. ALL SLAB PENETRATIONS SHALL BE SEALED WITH ELASTOMERIC POLYURETHANE SEALANT.

LEGEND:

- 4" RISER VENT
- 2" DIA SCH 40 PERFORATED PVC COLLECTION PIPE
- 4" DIA SCH 80 OR GALVANIZED SOLID WALL PIPE
- 30mil PVC MEMBRANE EXTENTS

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DESIGNED:	M. SPILLANE	DRAWN:	-
DESIGNED:	-	CHECKED:	-
SCALE:	AS NOTED	APPROVED:	M. SPILLANE

AVE 55
TAYLOR WAY METHANE MITIGATION

BUILDING A

DATE: JUNE 2018
PROJECT NO: 16-06475-000
DRAWING NO: C-1
SHEET NO: 3 OF 7

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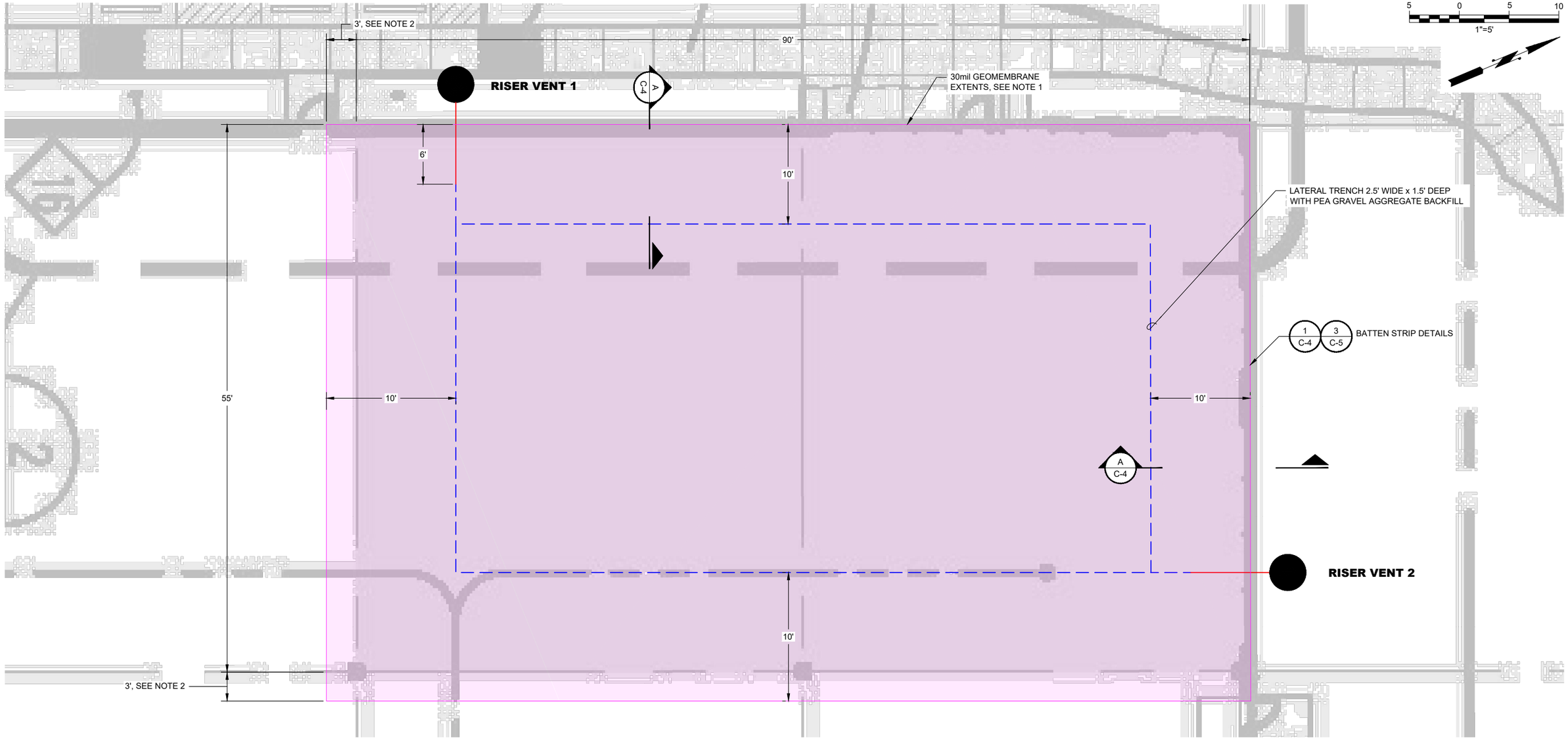

NOTES:

1. 30mil GEOMEMBRANE SHALL BE A CONTINUOUS SHEET UNDER BUILDING SLAB AND SHALL EXTEND TO EXTERIOR EDGE OF PERIMETER FOOTING OR BE SEALED TO FOOTINGS BY BATTEN STRIP.
2. EXTEND LINER 3' BEYOND OFFICE FOOTPRINT OR BATTEN STRIP TO FOOTING OR GRADE BEAM.
3. ALL PENETRATIONS THROUGH MEMBRANE SHALL BE BOOTED AND SEALED. SEE DETAILS 1 AND 2/C-5.
4. ALL INTERIOR VENT PIPING MUST BE PRESSURE TESTED USING HYDRO STATIC OR PNEUMATIC METHOD.
5. GRANULAR MATERIAL UNDER SLAB IN PIPE TRENCH SIZED LARGER THAN PERFORATIONS IN PIPE OR ADD GEOTEXTILE WRAP AROUND PERFORATED PIPE.
6. ALL SLAB PENETRATIONS SHALL BE SEALED WITH ELASTOMERIC POLYURETHANE SEALANT.

LEGEND:

- 2" RISER VENT
- 2" DIA SCH 40 PERFORATED PVC COLLECTION PIPE
- 2" DIA SCH 80 OR GALVANIZED SOLID WALL PIPE
- 30mil PVC MEMBRANE EXTENTS

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DESIGNED: M. SPILLANE	DRAWN: -
DESIGNED: -	CHECKED: -
SCALE: AS NOTED	APPROVED: M. SPILLANE

AVE 55
TAYLOR WAY METHANE MITIGATION

NORTH WEST OFFICE AREA OF BUILDING A

DATE:	JUNE 2018
PROJECT NO:	16-06475-000
DRAWING NO:	C-2
SHEET NO:	4 OF 7

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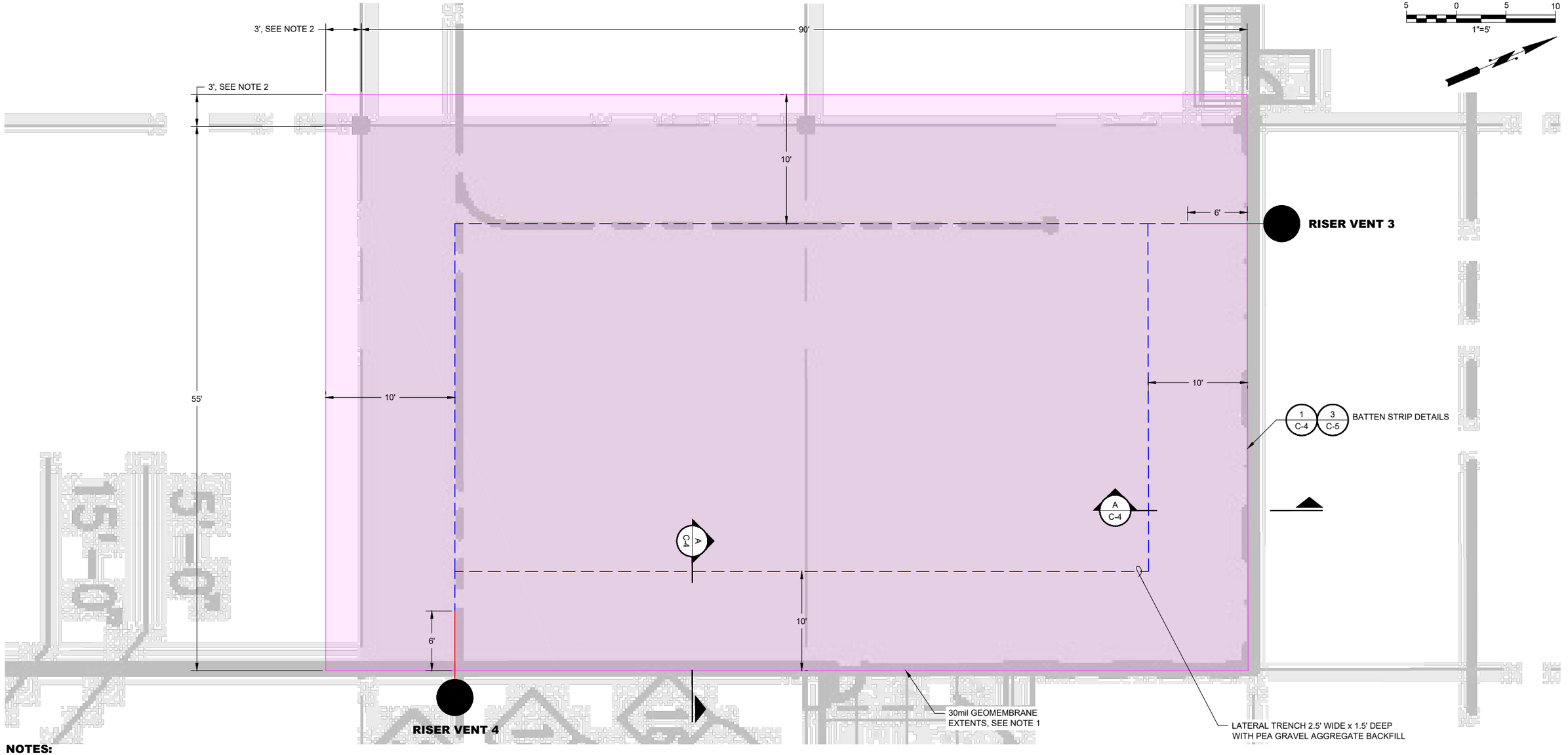

NOTES:

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2. EXTEND LINER 3' BEYOND OFFICE FOOTPRINT OR BATTEN STRIP TO FOOTING OR GRADE BEAM.
3. ALL PENETRATIONS THROUGH MEMBRANE SHALL BE BOOTED AND SEALED. SEE DETAILS 1 AND 2/C-5.
4. ALL INTERIOR VENT PIPING MUST BE PRESSURE TESTED USING HYDRO STATIC OR PNEUMATIC METHOD.
5. GRANULAR MATERIAL UNDER SLAB IN PIPE TRENCH SIZED LARGER THAN PERFORATIONS IN PIPE OR ADD GEOTEXTILE WRAP AROUND PERFORATED PIPE.
6. ALL SLAB PENETRATIONS SHALL BE SEALED WITH ELASTOMERIC POLYURETHANE SEALANT.

LEGEND:

- 2" RISER VENT
- 2" DIA SCH 40 PERFORATED PVC COLLECTION PIPE
- 2" DIA SCH 80 OR GALVANIZED SOLID WALL PIPE
- 30mil PVC MEMBRANE EXTENTS

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DESIGNED: M. SPILLANE	DRAWN: -	PROJECT NO: 16-06475-000	
DESIGNED: -	CHECKED: -	DRAWING NO: C-3	
SCALE: AS NOTED	APPROVED: M. SPILLANE	SHEET NO: 5 OF 7	

AVE 55
TAYLOR WAY METHANE MITIGATION

NORTH EAST OFFICE AREA OF BUILDING A

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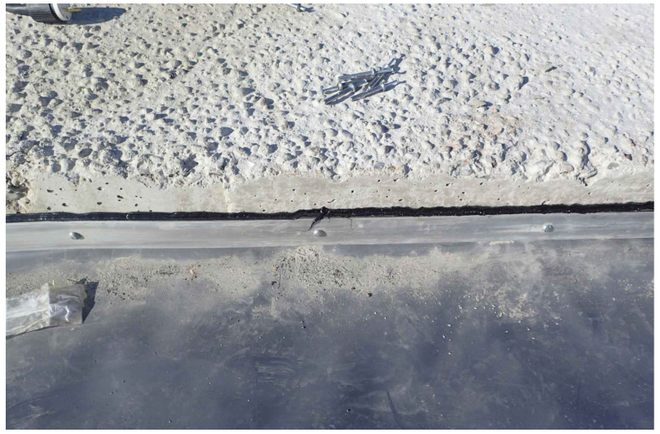
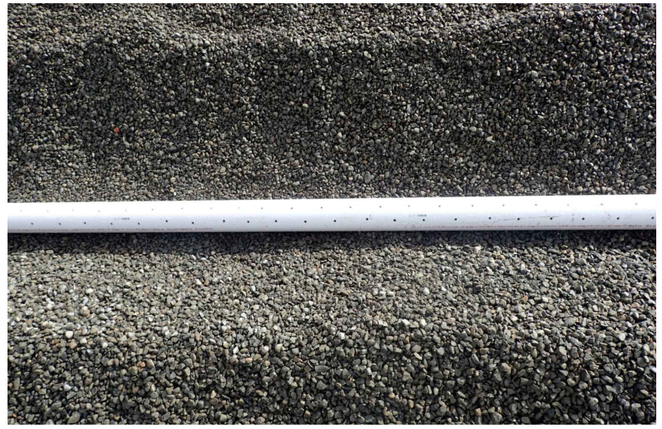


TYPICAL BATTEN STRIP SEAL PHOTO

SCALE: NTS

1 / -



TYPICAL PERFORATED COLLECTION PIPE PHOTO

SCALE: NTS

2 / -

TYPICAL COLLECTION PIPE TROUGH GRADE BEAM PHOTO

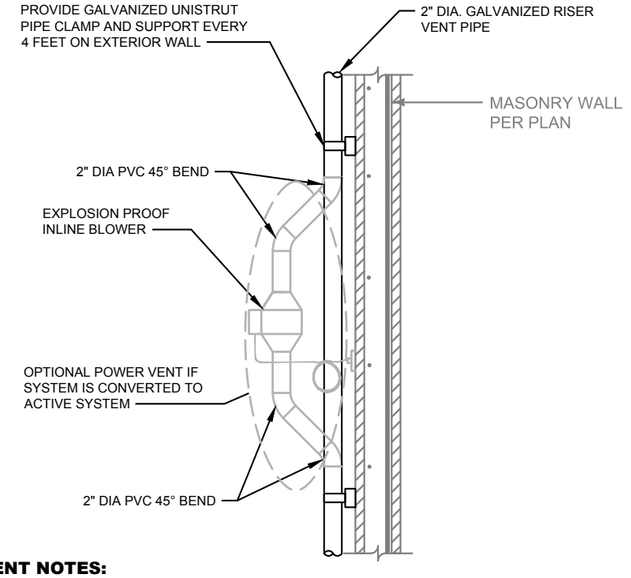
SCALE: NTS

3 / -

TYPICAL VENT PIPE AROUND EVE PHOTO

SCALE: NTS

4 / -



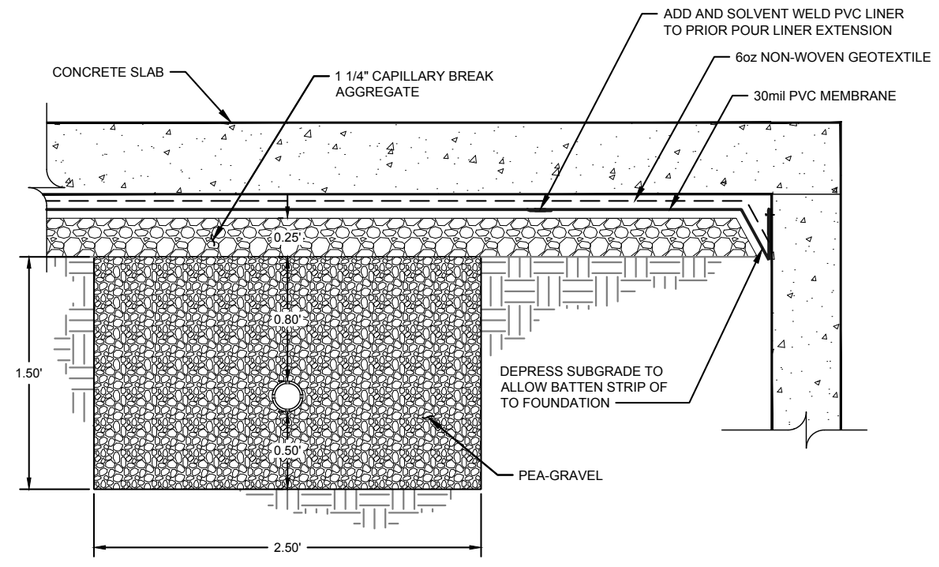
VENT NOTES:

1. 10 FEET OR MORE AWAY FROM ANY WINDOW, DOOR, ROOF HATCH, OPENING, OR AIR INTAKE INTO THE BUILDING.
2. 3 FEET OR MORE ABOVE HIGHEST POINT IN ROOF WITHIN 10 FEET.
3. 3 FEET OR MORE AWAY FROM ANY PARAPET.
4. 4 FEET OR MORE AWAY FROM PROPERTY LINE AND 10 FEET OR MORE AWAY FROM ELECTRICAL DEVICES.

TYPICAL INLINE BLOWER ON VENT PIPE DETAIL

SCALE: NTS

5 / -



TYPICAL COLLECTOR PIPE TRENCH SECTION

SCALE: NTS

A / C-2

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SCALE: AS NOTED	APPROVED: M. SPILLANE

AVE 55

TAYLOR WAY METHANE MITIGATION

TYPICAL DETAILS

DATE:	JUNE 2018
PROJECT NO:	16-06475-000
DRAWING NO:	C-4
SHEET NO:	6 OF 7

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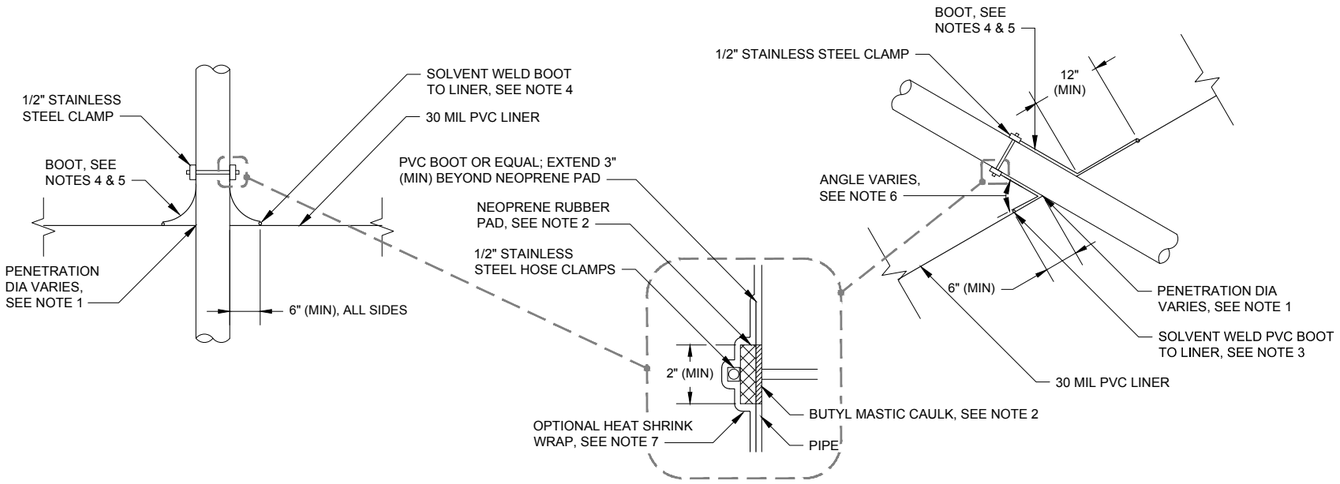


GENERAL NOTES:

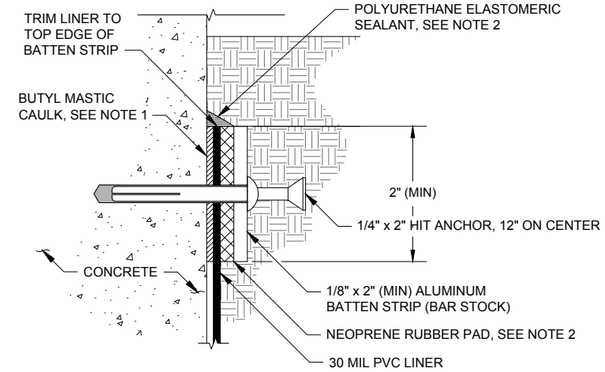
1. CONTRACTOR MAY USE PREFABRICATED PIPE BOOTS IN LIEU OF FIELD-FABRICATED BOOTS. CONNECT PREFABRICATED BOOT TO LINER AND PIPE PER MANUFACTURER'S RECOMMENDATIONS.

CONSTRUCTION NOTES:

1. CUT OPENING IN LINER FOR PIPE TO WITHIN 1/2" OF PIPE OUTSIDE DIAMETER.
2. APPLY BUTYL MASTIC CAULK AND NEOPRENE RUBBER PAD CONTINUOUSLY AROUND PIPE.
3. PROVIDE CONTINUOUS WELD AT PIPE BOOT/LINER INTERFACE.
4. FORM BOOT WITH SUFFICIENT MATERIAL TO PREVENT OVERSTRESSING DURING BACKFILLING, BUT WITHOUT FOLDS OR WRINKLES.
5. CONSTRUCT BOOT FROM SAME MATERIAL AS THE LINER.
6. ANGLE SHOULD NOT BE LESS THAN 30°. IF ANGLE IS LESS THAN 30° ADD SOIL AROUND THE PIPE TO INCREASE THE ANGLE AND PREVENT STRESSING AND CRACKING.
7. SEAL CLAMP AND END OF BOOT WITH HEAT SHRINK WRAP. EXTEND HEAT SHRINK WRAP ONE PIPE DIAMETER (MINIMUM) BEYOND CLAMP.

DETAIL - PERPENDICULAR PENETRATION WITH LINER (1 / -)
SCALE: NTS

DETAIL - ANGLED PENETRATION WITH LINER (2 / -)
SCALE: NTS



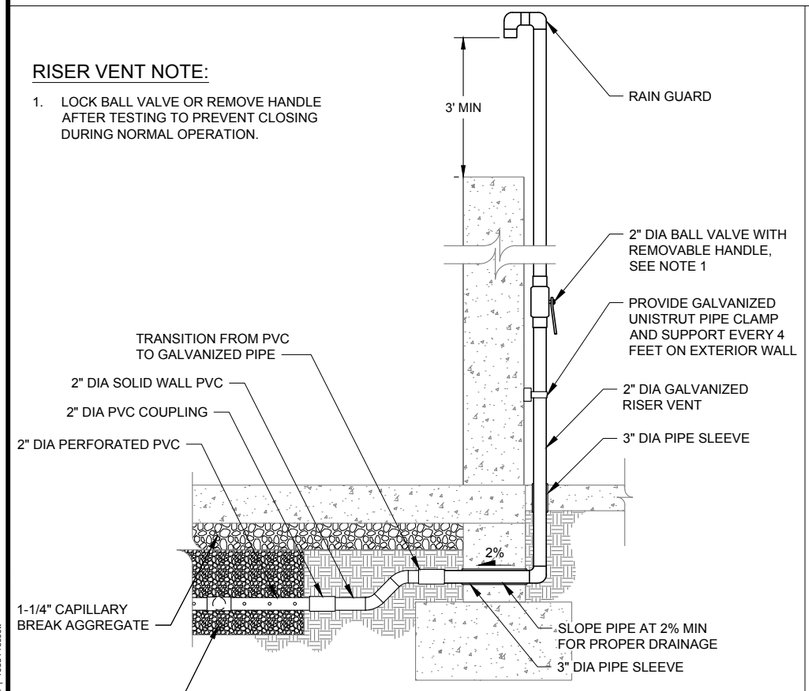
CONSTRUCTION NOTES:

1. APPLY BUTYL MASTIC CAULK, BATTEN STRIP, AND NEOPRENE RUBBER PAD CONTINUOUSLY ALONG TOP EDGE OF LINER.
2. APPLY BEAD OF POLYURETHANE ELASTOMERIC SEALANT CONTINUOUSLY ALONG TOP EDGE OF BATTEN STRIP ASSEMBLY.

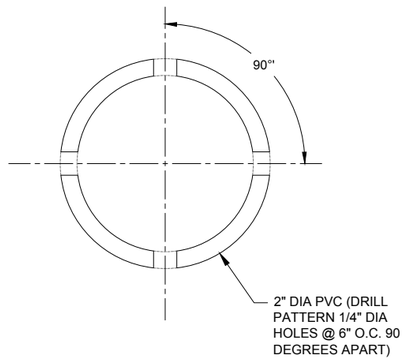
DETAIL - TYPICAL BATTEN STRIP (3 / -)
SCALE: NTS

RISER VENT NOTE:

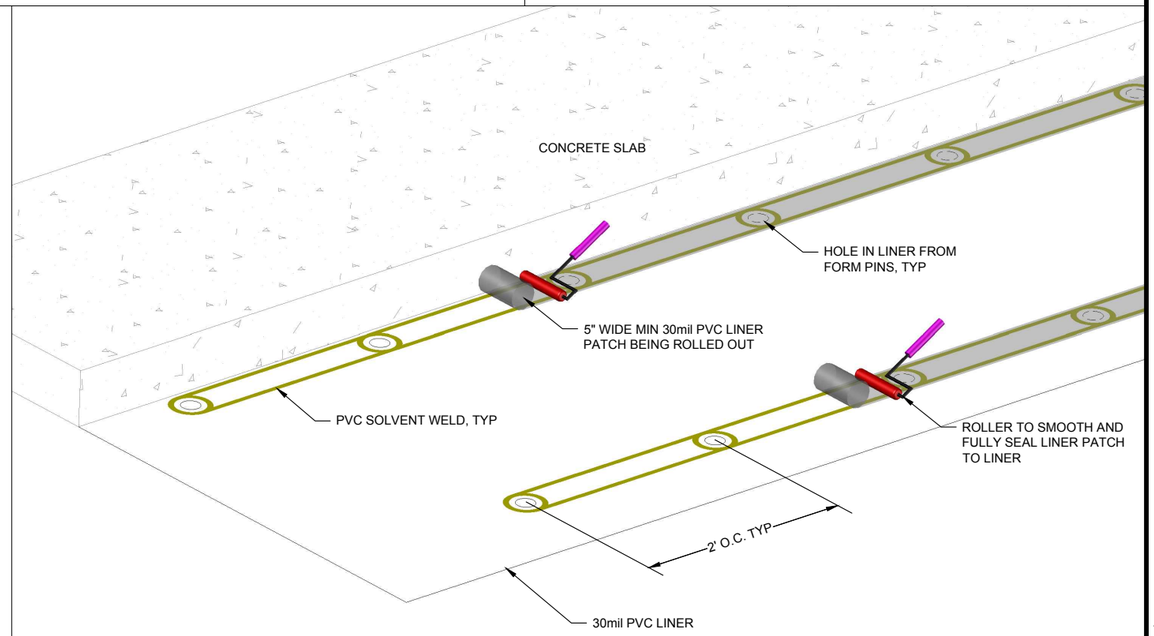
1. LOCK BALL VALVE OR REMOVE HANDLE AFTER TESTING TO PREVENT CLOSING DURING NORMAL OPERATION.



DETAIL - PIPE PENETRATION TROUGH EXTERIOR WALL (4 / -)
SCALE: NTS



DETAIL - PIPE PERFORATION DETAIL (5 / -)
SCALE: NTS



DETAIL - 30mil PVC LINER PATCHING (6 / -)
SCALE: NTS

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MICHAEL M. SPILLANE — STATE OF WASHINGTON — 30780 — REGISTERED PROFESSIONAL ENGINEER

DESIGNED: K. JOHNSON	DRAWN: T. PRESCOTT		
DESIGNED: M. SPILLANE	DRAWN: -		
DESIGNED: -	CHECKED: -		
SCALE: AS NOTED	APPROVED: M. SPILLANE		

AVE 55
TAYLOR WAY METHANE MITIGATION

PENETRATION DETAILS

DATE:	JUNE 2018
PROJECT NO:	16-06475-000
DRAWING NO:	C-5
SHEET NO:	7 OF 7

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Daily Field Report

Project No. 16-06475-000

(1) **Day** Thursday **Date** 05/31/18 **Work Period** 7:00 **AM** **to** 9 **AM** **Report No.** 1

Weather overcast **Temp. Max.** 48 **°F** **Min.** 45 **°F** **Precipitation** no

(2) **Personnel On Site**

Todd Prescott - Herrera		
Sam - Sierra		
Drew – Ave 55		

(3) **Major Equipment on Project and Amount of Use**

No.	Description	Size/Capacity	Hrs. Oper.
1	CAT excavator 336E	large	
1	Grading machine		

(4) **Work Accomplished Today**

Inspected and approved 2-inch diameter perforated Sch 40 PVC for the north west office area.

Backfilled pipe trench with pea-gravel and graded with 1-1/4” capillary break aggregate.

30 mil PVC liner was delivered, and non-woven geotextile was ordered.

See Field notes.

(5) **Action Items:**

Todd and Michael to discuss exact liner/batten strip connection to foundation and update plans.

(6) Todd Prescott — Signature

5-31-2018 — Date

16-06475-000 Taylor Way Methane Weather: overcast Temp low of 45 - high of 48

Tuesday 5/31/2018

7:00 I arrived on-site, met with Sam from Sierra and Drew from Ave 55. After a brief discussion they showed me the north west office area site of building A. Pipe trenches were 2.5-feet wide and bedded with pea-gravel. The 2-inch diameter perforated schedule 40 had already been drilled and laid out per the plains. The 0.25-inch perforations were drilled at 6-inches on center 90 degrees apart. The Perforated pipes covered a 70-foot by 35-foot rectangle with two stubs extending out 11.5-feet for the future vertical riser vents.

7:45 1-foot of pea-gravel is being backfilled over perforated pipe.

8:15 Perforated pipe trench is fully backfilled.

8:30 Large CAT grading machine began grading the 1-1/4-inch capillary break aggregate.

8:45 Leaving site.

Todd Prescott 6/4/2018

Daily Field Report

Project No. **16-06475-000**

(1) **Day** Wednesday **Date** 06/06/18 **Work Period** 7:00 **AM** **to** 10:30 **AM** **Report No.** 2

Weather Sunny **Temp. Max.** 60 **°F** **Min.** 58 **°F** **Precipitation** no

(2) **Personnel On Site**

Todd Prescott - Herrera

Sam - Sierra

Wade – Sierra

(3) **Major Equipment on Project and Amount of Use**

No.	Description	Size/Capacity	Hrs. Oper.
	N/A		

(4) **Work Accomplished Today**

NW office area of Building A - I inspected and approved 2 vertical pipe penetrations. Inspected and approved the geotextile over the liner.

See Field notes.

(5) **Action Items:**

When forms on the north and west side of the office area are removed, all of the 2-foot on center pin holes for the forms will need to be patched using 30mil PVC liner and solvent welded.

(6) Todd Prescott — Signature

6-6-2018 — Date

16-06475-000 Taylor Way Methane Weather: sunny Temp low of 58 - high of 60

Wednesday 6/6/2018

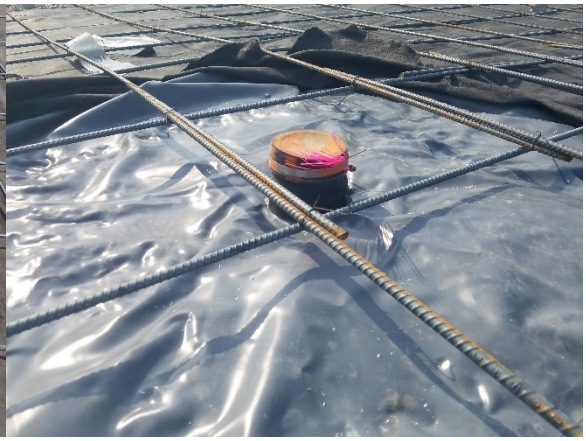
7:00 I arrived on-site, met with Wade from Sierra. I observed Sierra installing two vertical pipe penetrations using two pre-fabricated pipe penetration boots, butyl mastic strip, and polyurethane elastomeric sealant at both penetrations. Penetration zones were then covered with 6oz non-woven geotextile.

30mil PVC liner and geotextile extended over 3-feet past office area extents on the South and East side of the Office area. The North and West sides of the office area will be secured and sealed using batten strips.

When the concrete forms on the North and West sides of the office area are removed, all of the holes from the pins holding the forms at 2-feet on center will need to be patched, using 30mil PVC liner and solvent welded for a continuous seal.

Batten strip connection and pin hole patching will need to be inspected before final concrete pour.

10:30 I am leaving the site.



Todd Prescott   6/6/2018