Environment / Energy / Infrastructure

April 20, 2020

Mr. Josh Parker
Cross Street Partners
2400 Boston Street, Suite 404
Baltimore, MD 21224

RE: Vapor Mitigation Pilot Testing at the Former General Electric Property Located at 1635 Broadway (1701 College St.), Fort Wayne, Indiana (Site), CSP001.300.0001.

Dear Mr. Parker:

Hull & Associates, (Hull) implemented vapor mitigation pilot testing at the Former General Electric Property in Ft. Wayne Indiana over the period of May 7 through May 10, 2018. The pilot testing was completed to support design of a vapor mitigation system for onsite buildings with the potential for vapor intrusion of volatile organic compounds (VOCs). Pilot testing was implemented in accordance with available vapor mitigation guidance, including Indiana Department of Environmental Management (IDEM) and U.S. Environmental Protection Agency (USEPA) technical guidance documents for vapor intrusion mitigation systems and vapor intrusion remedy selection and implementation[1,2,3]. Pilot study testing procedures, results of the pilot study, and conceptual full-scale design details for sub-slab depressurization system (SSDS) equipment are presented in this report.

IMPLEMENTATION OF VAPOR MITIGATION PILOT TEST

Pilot testing was implemented in Buildings 20, 22, 24, 26, 27, and 36. These buildings were selected based on review of past indoor air and sub-slab vapor sampling that indicated concentrations at these buildings exceeded Indiana Department of Environmental Management (IDEM) vapor intrusion screening levels. **Figure 1** displays the pilot testing locations in each building. The purpose of the testing was to assess sub-slab air flow and vacuum influence during application of vacuum to pilot study extraction points. The following sections describe the procedures utlized for implementation of the pilot testing.

Extraction Point Installation

Pilot study vacuum extraction points were installed within Buildings 20, 22, 24, 26, 27, and 36. The locations of the extraction points are shown on Figure 1. The extraction points were installed by coring a 12"-diameter hole through the concrete slab, removing 12" of sub-slab materials, and backfilling the pit with pea gravel to the base of the existing concrete. The extraction point design was consistent with IDEM's Technical Guidance for Vapor Mitigation Systems. A 3-inch diameter steel extraction pipe was installed in the center of the extraction point and was extended into the pea gravel. A stainless-steel mesh screen was installed around the bottom of the extraction pipe to prevent small diameter gravel/fines from being drawn into the blower during vacuum extraction. New concrete was installed around the extraction pipe to match the existing thickness of the concrete that was removed. With the exception of Building 27, the existing concrete thickness was approximately 8 to 12-inches at each pilot testing location. In Building 27, the concrete was approximately 18-inches thick, requiring a larger concrete corer to install this extraction point.

[1] Indiana Department of Environmental Management. Sep. 2014. Technical Guidance Document: Vapor Mitigation Systems
[2] Indiana Department of Environmental Management. Feb. 2014. Draft Interim Technical Guidance Document: Vapor Remedy Selection and Implementation
[3] U.S. Environmental Protection Agency. 2015. OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor to Indoor Air

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Pilot Testing Procedures
Individual vacuum extraction tests were implemented at each extraction point. Testing at each location included a continuous extraction test in which a constant vacuum level was applied to the extraction point for several hours, as well as a step test in which several vacuum "steps" were applied to the extraction point to evaluate air flow and radius of influence at various levels. A 1.5 HP regenerative blower (Gast Model R4P115) was used for vacuum application, and a particulate filter was installed in the vacuum line upstream of the blower to prevent carry-over of particulates into the blower. The blower's air discharge stream was routed to ambient air outside the building. Based on discussions with IDEM, and pursuant to Indiana code 326 IAC 2-1.1-3h2, an air permit was not required for the pilot test[4].

The following field measurements were collected during pilot testing at each location:

- Flowrate from the extraction point (using a pitot tube);
- Vacuum at the extraction point (using a magnehelic gauge);
- Sub-slab vacuum at various distances from the vacuum extraction point (using a digital micromanometer with a sensitivity range of 0.00001 inches of water) and
- Photo-Ionization Detector (PID) readings from the blower air stream.

Cox-Colvin Vapor Pins® were used to collect the sub-slab vacuum measurements. Pins were installed radially from the extraction points at various distances to determine the extent of vacuum propagation. **Attachment A** includes a summary of the data collected during pilot testing.

Blower Effluent Air Sampling
An air sample was collected from the blower effluent air stream during pilot testing at each extraction point. Samples were analyzed for VOCs by U.S.EPA Method TO-15. Air sampling was conducted in order to estimate anticipated VOC emissions from permanent, full-scale mitigation system as discussed at the conclusion of this report.

RESULTS OF VAPOR MITIGATION PILOT TEST

Sub-Sab Vacuum Influence
Charts 1 through 6 display the sub-slab vacuum level (i.e., differential pressure between the sub-slab and indoor air) detected at various distances from the extraction points. Each individual line on the charts represent a different applied vacuum at the extraction point. As expected, the vacuum radius of influence increased with increased applied vacuum. Literature on historic case studies of commercial subslab depressurization systems indicates a minimum sub-slab vacuum of 0.004" H_2O will mitigate soil vapor intrusion[5]. This minimum vacuum performance criterion is shown as a dashed horizontal line on the charts. Charts 1 through 6 indicate that a radius of influence (to a vacuum level 0.004" H_2O) of approximately 30 to 40 feet was achieved in Building 24 and 25, 40 to 50 feet in Building 36, 60 to 70 feet in Buildings 20 and 22, and 80 to 90 feet in Building 27. Overall, this data indicates that good sub-slab vacuum propagation was achieved during pilot testing, indicating the Site is conducive to vapor mitigation via an active depressurization system. The somewhat lower vacuum influence in Buildings 24 & 25 relative to the other buildings was due to finer grained soils encountered beneath these buildings.

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[4] Kraszyk, J., IDEM, (Feb. 23, 2016). Phone discussion with Smith, T. (Hull & Associates, Inc.)
[5] Brodhead, William and Thomas E. Hatton. High Vacuum, High Airflow Blower Testing and Design for Soil Vapor Intrusion Mitigation in Commercial Buildings. pp.2.

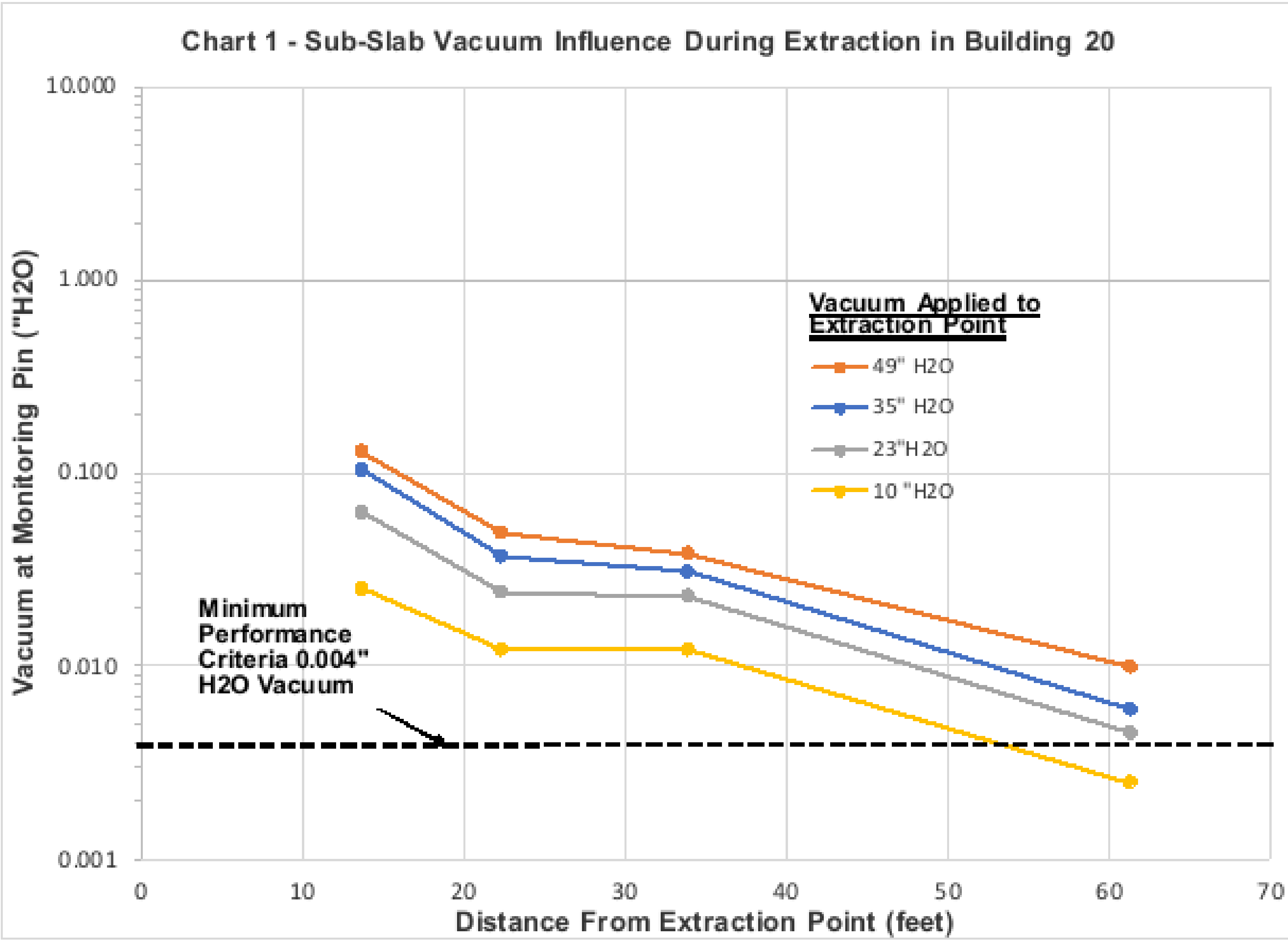


Chart 1 - Sub-Slab Vacuum Influence During Extraction in Building 20
Vacuum at Monitoring Pin ("H2O)
10.000
1.000
0.100
0.010
0.001
0
10
20
30
40
50
60
70
Distance From Extraction Point (feet)
Vacuum Applied to Extraction Point
49" H2O
35" H2O
23"H2O
10 "H2O
Minimum Performance Criteria 0.004" H2O Vacuum

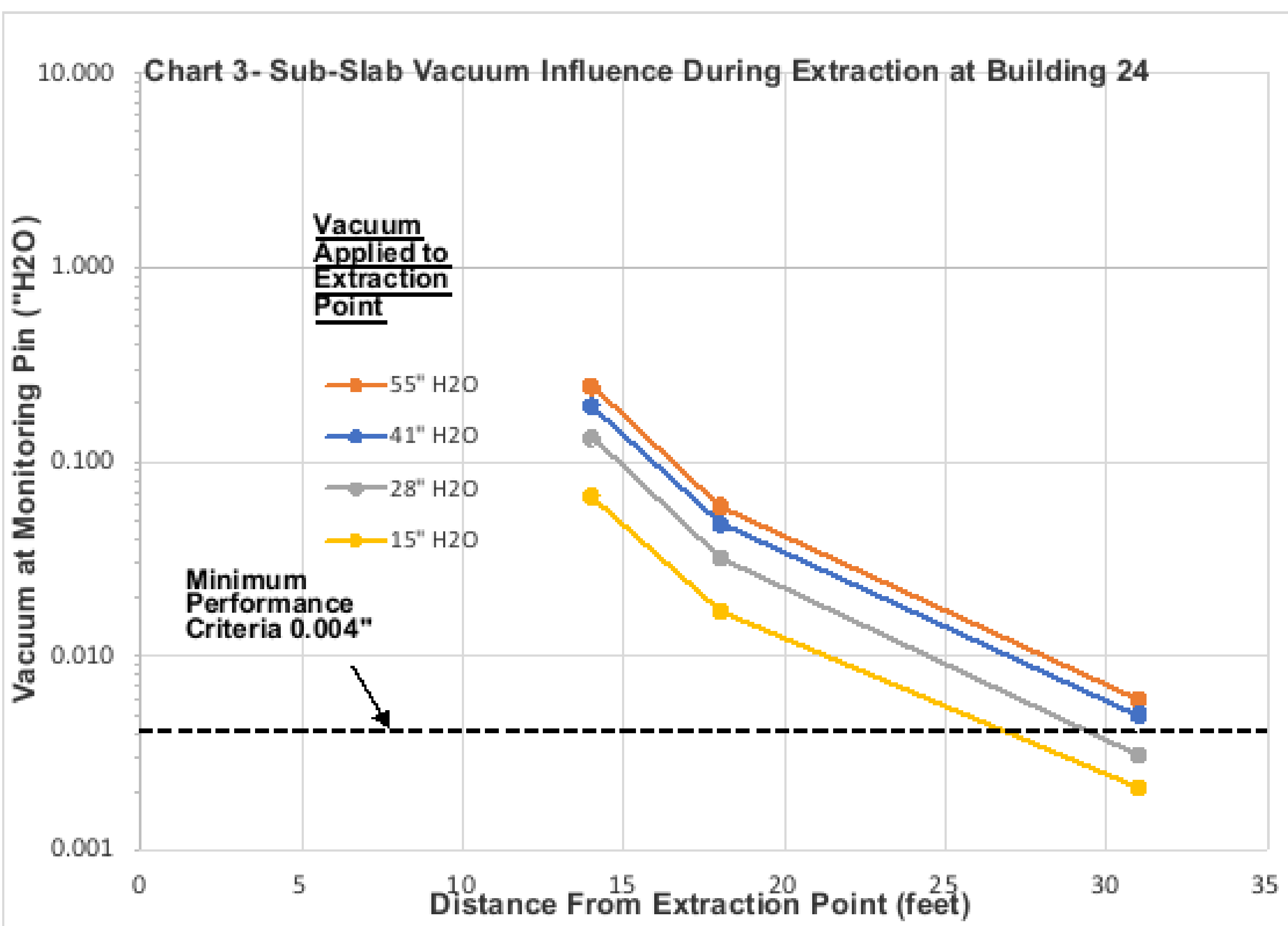


Chart 3- Sub-Slab Vacuum Influence During Extraction at Building 24
10.000
1.000
0.100
0.010
0.001
Vacuum at Monitoring Pin ("H2O)
Vacuum Applied to Extraction Point
55" H2O
41" H2O
28" H2O
15" H2O
Minimum Performance Criteria 0.004"
0
5
10
15
20
25
30
35
Distance From Extraction Point (feet)

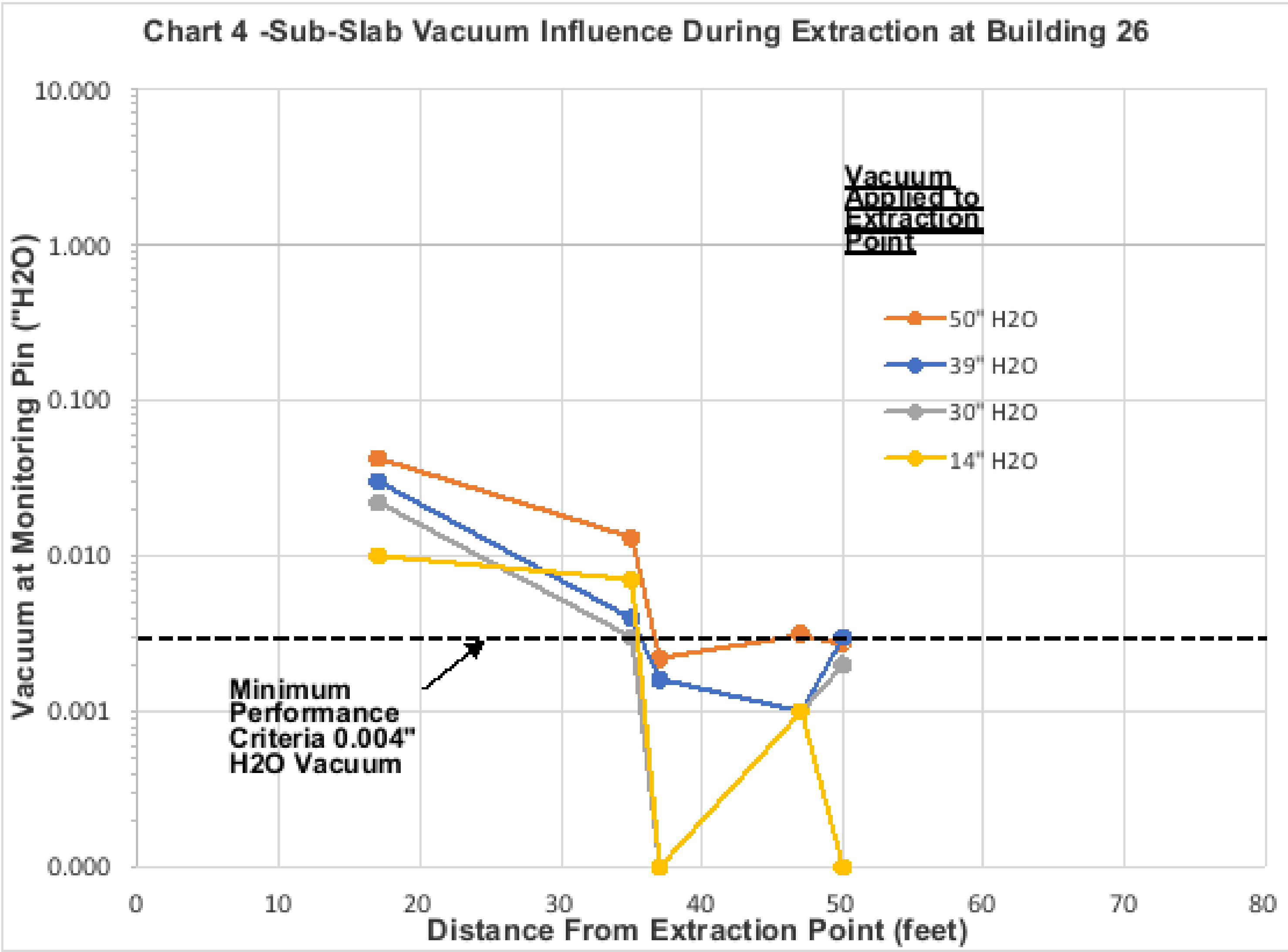


Chart 4 -Sub-Slab Vacuum Influence During Extraction at Building 26
Vacuum at Monitoring Pin ("H2O)
10.000
1.000
0.100
0.010
0.001
0.000
0
10
20
30
40
50
60
70
80
Distance From Extraction Point (feet)
Vacuum Applied to Extraction Point
50" H2O
39" H2O
30" H2O
14" H2O
Minimum Performance Criteria 0.004" H2O Vacuum

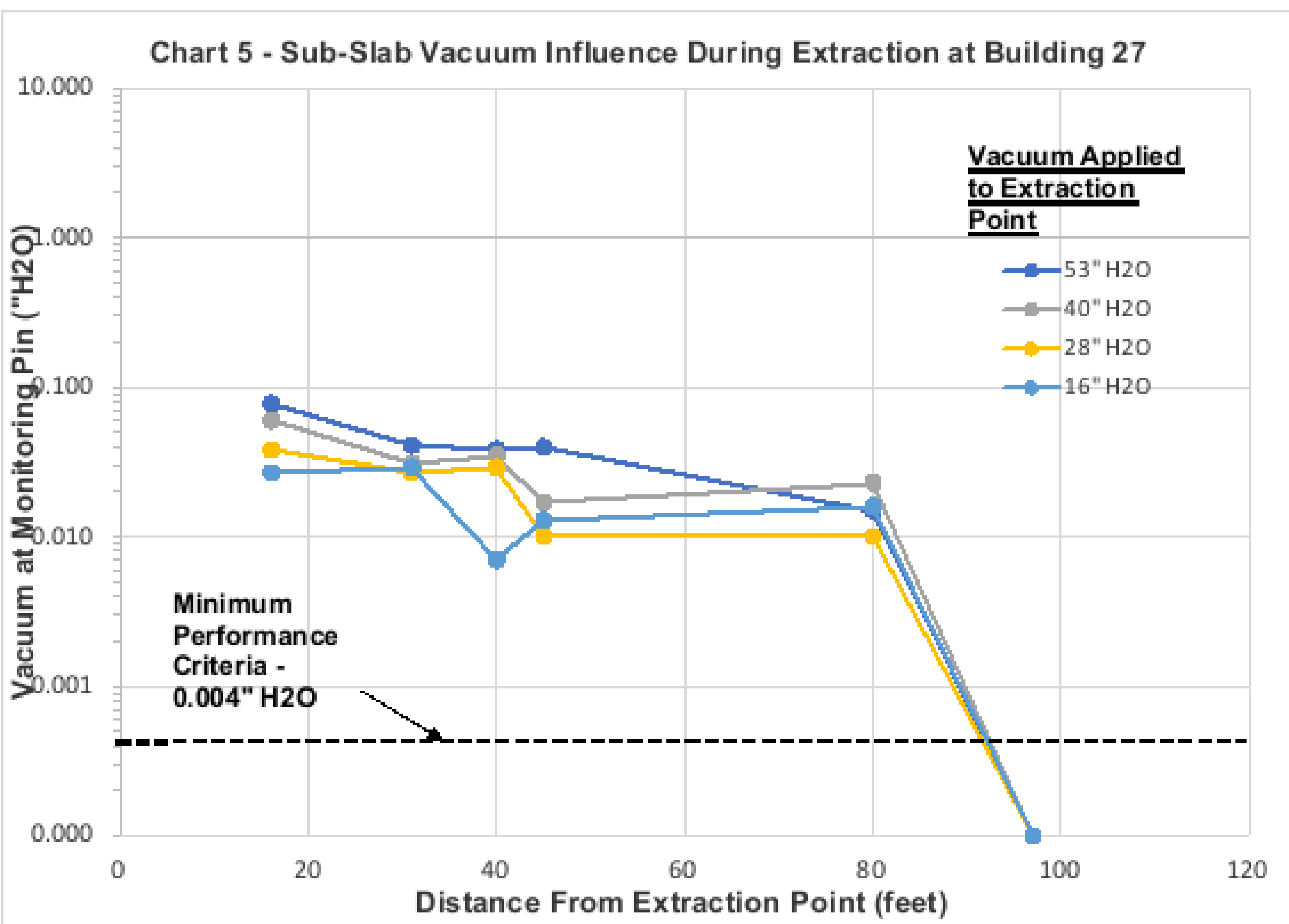
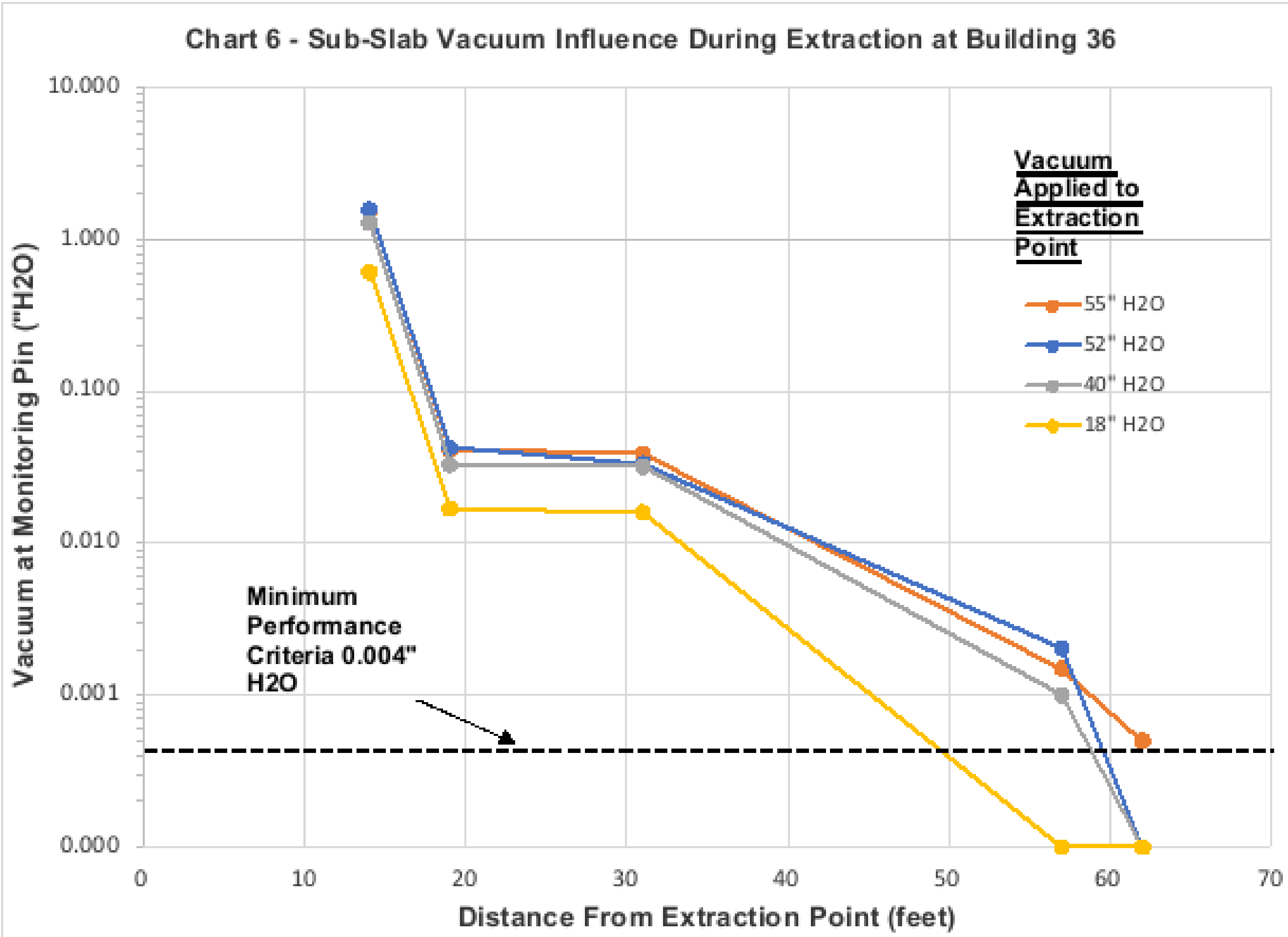


Chart 5 - Sub-Slab Vacuum Influence During Extraction at Building 27
Vacuum at Monitoring Pin ("H2O)
10.000
1.000
0.100
0.010
0.001
0.000
0
20
40
60
80
100
120
Distance From Extraction Point (feet)
Vacuum Applied to Extraction Point
53" H2O
40" H2O
28" H2O
16" H2O
Minimum Performance Criteria - 0.004" H2O



Air Monitoring Results

Air Sampling results from the pilot testing are included in **Appendix B**. This data includes samples collected from the blower effluent stream from each building. As anticipated, trichloroethene (TCE) was the dominant parameter detected in the air samples. Table 1 displays the TCE concentrations detected in each building.

Table 1: Pilot Testing Blower Effluent TCE Measurements

Building	TCE Concentration (ug/m^3)
20	10300
22	16000
24	133000
26	324
27	23400
36	104

Besides TCE, other VOCs in the blower effluent air samples were non-detect or present at very low concentrations. PID measurements collected during pilot testing (see Appendix A) were consistent with the air sampling results, indicating that the highest concentrations were present beneath Building 24, and the lowest concentrations beneath Buildings 26 and 36.

CONCEPTUAL FULL-SCALE VAPOR MITIGATION SYSTEM

Based on the presence of a vapor intrusion source beneath the onsite Buildings (i.e., TCE groundwater plume), and the periodic exceedance of IDEM vapor intrusion screening levels, it may be necessary to implement actions to mitigate vapor intrusion at the Site. The IDEM Remediation Closure Guide states the following:

> *"If the VI pathway is complete, and IA exceeds IASLs, then action is necessary to reduce exposure. Possible actions include source removal, source remediation, installation of a venting system, SGss depressurization system, or any other means of reducing exposure to an acceptable level"* (*Section 10.5.3 Vapor: Closure, Chronic Exposure*).

IDEM's Technical Guidance Document for Vapor Mitigation Systems provides a summary of various vapor mitigation techniques, including vapor barriers, passive and active depressurization systems, indoor air cleaners, and building pressurization/HVAC modifications. For new construction, installation of a vapor barrier and passive venting system is the most common method of vapor mitigation. However, for existing buildings where installation of a sub-slab barrier is not possible, active sub-slab depressurization system (SSDS) is often employed for vapor mitigation. Based on results of the vapor mitigation pilot test, an SSDS is anticipated to effectively mitigate sub-slab vapor intrusion at the Site.

General Description of Active Sub-Slab Depressurization

An active SSDS mitigates vapor intrusion by applying a low-level vacuum to multiple vapor extraction points or horizontal collection laterals strategically installed across the footprint of the building. The SSDS creates a negative pressure gradient which prevents soil gas migration from the subsurface into the building. The purpose of a SSDS is not to remediate impacted soils or groundwater beneath the building, but rather to maintain a negative pressure gradient below the floor, thereby preventing the migration of subsurface contaminants into the building. The low-level vacuum provides a preferential pathway to vent VOC vapors from the fill layer(s) below the building to outdoor air above the breathing zone. The vacuum is typically applied by one or more ventilation fans/blowers connected to the extraction points or laterals.

Operation and Maintenance (O&M) requirements for an active SSDS include routine inspections of system components, and minor maintenance to the extraction blower(s). Sub-slab differential pressure measurements are collected, generally on an semi-annual or annual basis, to demonstrate that a negative pressure differential exists between the sub-slab and indoor air. According to IDEM vapor mitigation technical guidance, periodic collection of indoor air samples is also required to document VOC concentrations are below established indoor air standards. Air sampling is typically more frequent during the first few years of operation, after which, sub-slab vacuum measurements are utilized to demonstrate adequate vapor mitigation is being maintained by the SSDS.

Conceptual System Design

<u>Differential Pressure Design Target</u>

Various guidance documents recommend differing targets for the sub-slab vacuum required to effectively mitigation vapor intrusion. USEPA guidance for mitigation of schools and large buildings suggests maintaining a target differential pressure of -0.002" H_2O for effective vapor intrusion mitigation[6]. ASTM Standard E 2121-03 suggests a design target sub-slab differential pressure of -0.025" H20 to -0.035" H20 to sufficiently mitigate vapor intrusion, while literature on historic case studies of commercial SSDS indicates a target of -0.004" H_20 differential pressure [7,8]. Based on Hull's experience, -0.008" H_20 differential pressure is recommended as a design target for an SSDS. This design target will ensure a minimum performance standard of -0.004" H_20 is maintained during all weather conditions.

System Components

Based on pilot testing, this section describes typical vapor mitigation system components that may be utilized at the Site. The final design plans and end-use of the on-Site buildings will significantly influence the requirements, design and layout of the vapor mitigations system. For example, vapor mitigation may not be required for a Building that includes an open-air parking garage on the lower floor(s). Because a final redevelopment plan is not currently available, a general summary of the SSDS components is provided below. It is anticipated that an active SSDS would consist of the follow key features:

- **Extraction Points & Risers** – For each building requiring vapor mitigation, a series of vapor extraction points would be installed to ventilate sub-slab vapors. The extraction points would be evenly spaced across a building footprint. For Buildings 24, 26 & 36, the spacing between points would be approximately 50 to 75 feet, and for Buildings 20, 22, & 27, the spacing would be approximately 75 to 100 feet. A vertical extraction riser would be connected to each extraction point. The riser would include a manual flow control valve, vacuum gauge, and sample port. A typical detail of an SSD extraction point and riser is included as **Exhibit 1** in **Appendix C**.

- **Extraction Piping** –Extraction piping would be installed to connect each extraction point within a building to a common header. The header pipe would be routed to a blower located outside the Building. Extraction piping is typically constructed of 3-inch and 4-inch PVC. A typical detail of an extraction pipe is included as **Exhibit 3** in **Appendix C**.

- **Vacuum Blowers Systems** – The vacuum extraction header pipe would be connected to a vacuum blower system located on the exterior of the buildings. The blower system could be anchored to the roof of the building, or located at ground level, with the discharge pipe routed to above the roofline. In general, each Building requiring mitigation would have at least one blower system. However, it may be possible to utilize a single blower for buildings located adjacent to each other (e.g., Buildings 20 and 22). The vacuum extraction blower(s) are expected to be sized for approximately 250 to 500 cfm and a vacuum of 70" H_2O. Regenerative blowers in the range of 5 to 10-HP are commonly used for this application. In-line particulate filters would be installed to protect the blowers from damage. The vacuum blowers would be installed within a small weatherproof enclosure. The enclosure would include a disconnect switch and small control panel with a hand-off-auto (HAO) witch and alarm light. Remote telemetry can also be included in the system design to allow for remote system monitoring and notification of alarms. A typical detail of an SSDS blower system is included as **Exhibit 4** in **Appendix C.**

[6] U.S. Environmental Protection Agency. 1994. Radon Prevention in the Design and Construction of Schools and Other Large Buildings. Air and Energy Engineering Research Laboratory EPA/625/R-92/016, Research Triangle Park, North Carolina, pp.13-14, 22.
[7] American Society for Testing and Materials (ASTM). Standard Practice for Installing Radon Mitigation Systems in Existing Low-Rise Residential Buildings (E 2121-03). pp.12.
[8] Brodhead, William and Thomas E. Hatton. High Vacuum, High Airflow Blower Testing and Design for Soil Vapor Intrusion Mitigation in Commercial Buildings. pp.2.

A typical process flow diagram for an SSDS is included as **Exhibit 5** in **Appendix C.**

In addition to the system components described above, an important requirement during installation of an active vapor mitigating system is to seal cracks and openings in the concrete floor to prevent short-circuiting of the system and potential vapor intrusion. The vapor mitigation design and installation plans would include details and specifications for crack sealing. To monitor the sub-slab vacuum, a series ¼-inch vacuum monitoring pins would be installed in each building. A typical detail for an monitoring pin is included as **Exhibit 2** in **Appendix C.**

Estimated VOC Emissions

Estimated air emissions for a full-scale SSDS for Buildings 20, 22, 24, 26, 27, and 36 are summarized on **Table 1** of **Appendix D**. The combined VOC emissions for the entire facility was estimated to be 0.55 tons/year of total VOCs, of which, TCE emissions were estimated to be 0.54 tons/year (i.e., 98% of the total VOCs). Based on discussions with IDEM, an air emission source may be exempt from air permitting if potential emissions are less than 10 tons per year of total VOCs, 1 ton per year of a single hazardous air pollutant (HAP), or 2.5 tons per year of a combination of HAPs. The estimated facility-wide emissions are below these thresholds; however, estimated TCE emissions are approximately 55% of the single HAP threshold. As shown on Table 1 of Appendix D, most of the TCE emissions are expected to be from Building 24; therefore, installation of an activated carbon vessel to treat the blower effluent from Building 24 may be warranted. Samples from the blower effluent could be collected following startup to document the actual TCE emissions. Once emissions are demonstrated to be below the 1 ton per year threshold, the activated carbon treatment could be removed.

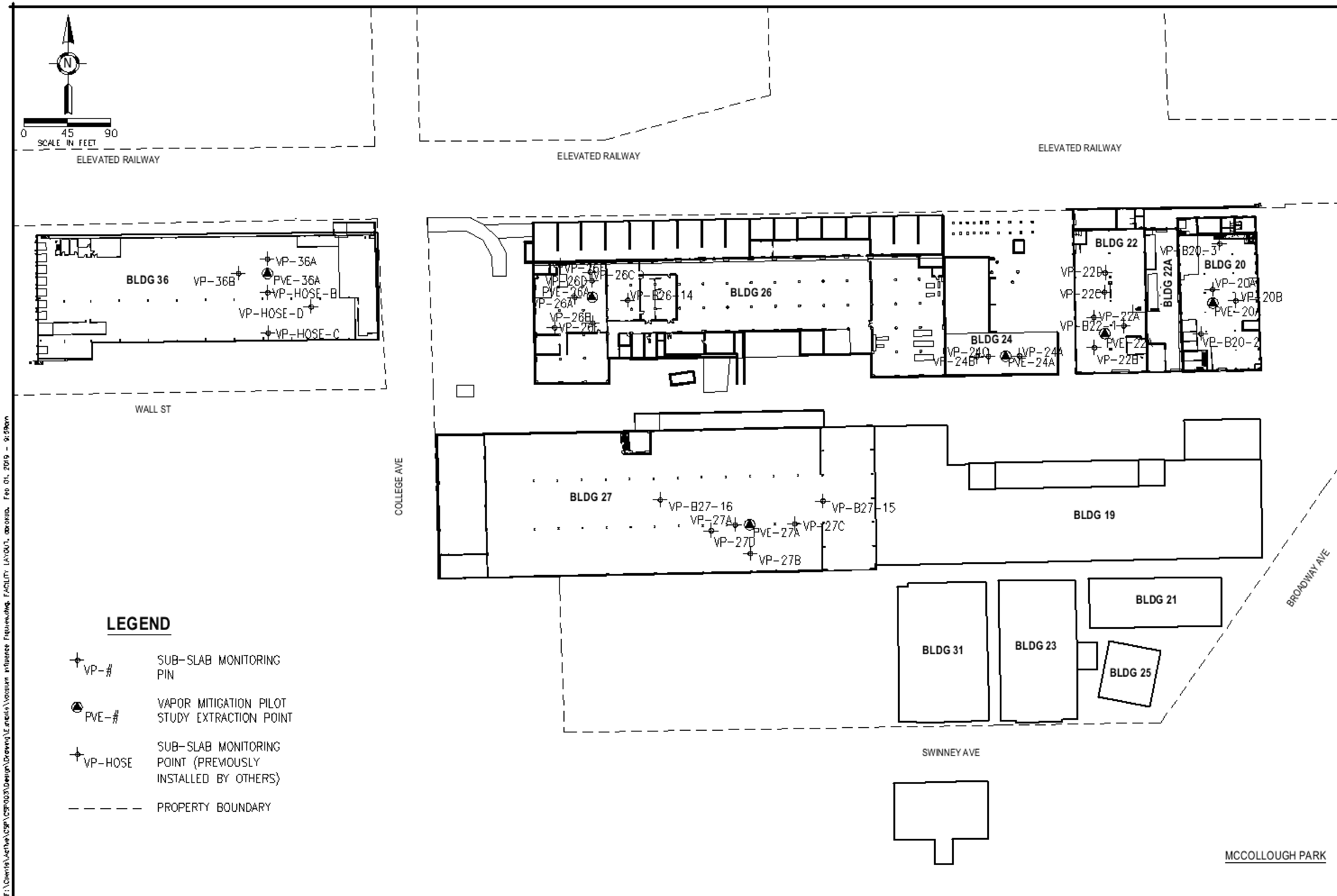
We trust this report meets your needs at this time. As you are aware, these pilot test results and more recent sub-slab and indoor air sampling data are being used to design potental SSDS for certain structures, in coordination with the architectural, design, and construction teams. Should you have any questions about the results of this pilot test report, or the SSDS design process going forward, please don't hesitate to contact Doug Stuart by email at dstuart@hullinc.com or by telephone at (614) 362-7110 or (317) 517-6506. We appreciate the opportunity to assist with your redevelopment project.

Respectfully,

Travis Smith, P.E.
Remediation Practice Leader

Doug Stuart, CHMM
Senior Project Manager

FIGURES



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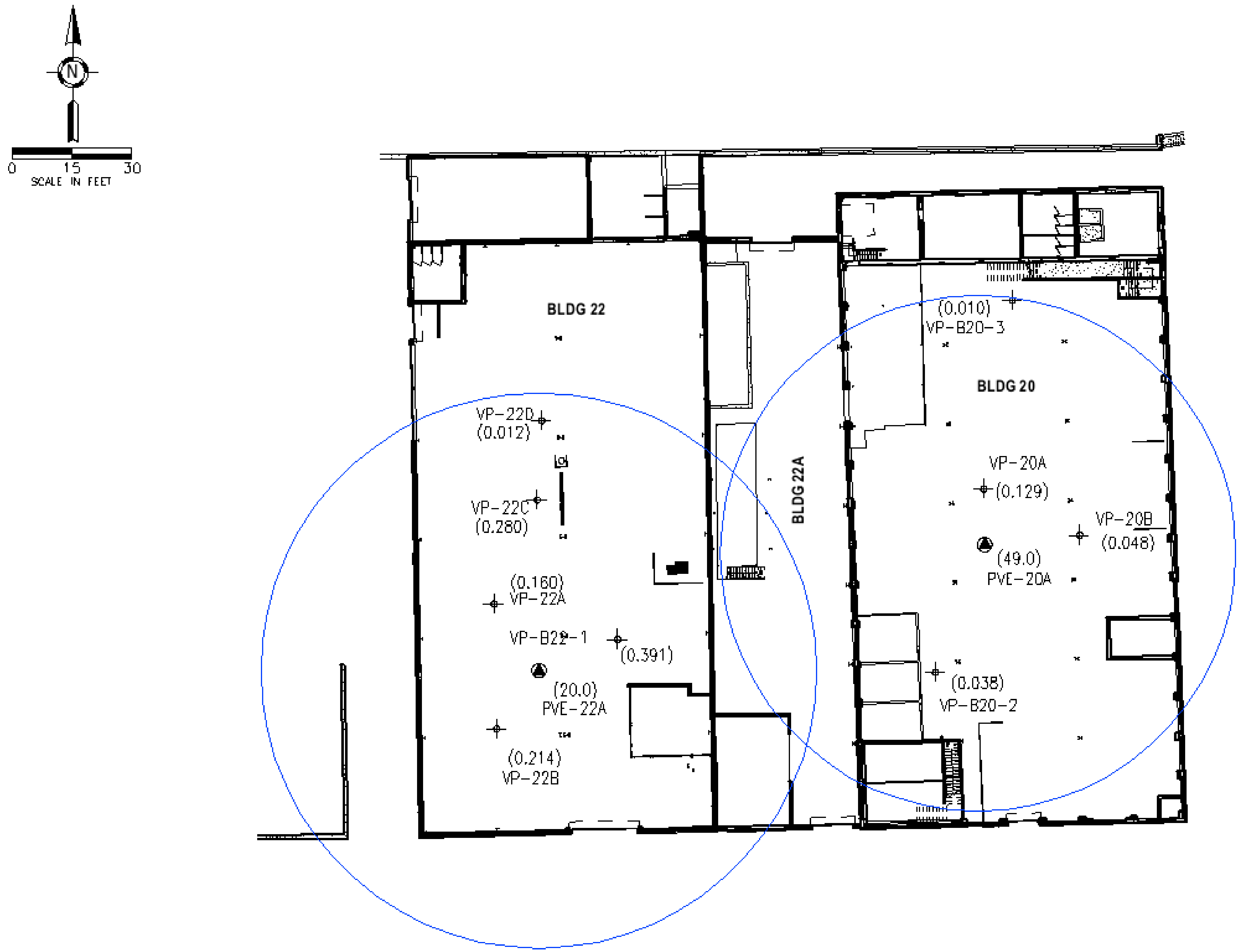
OVERALL SITE PLAN

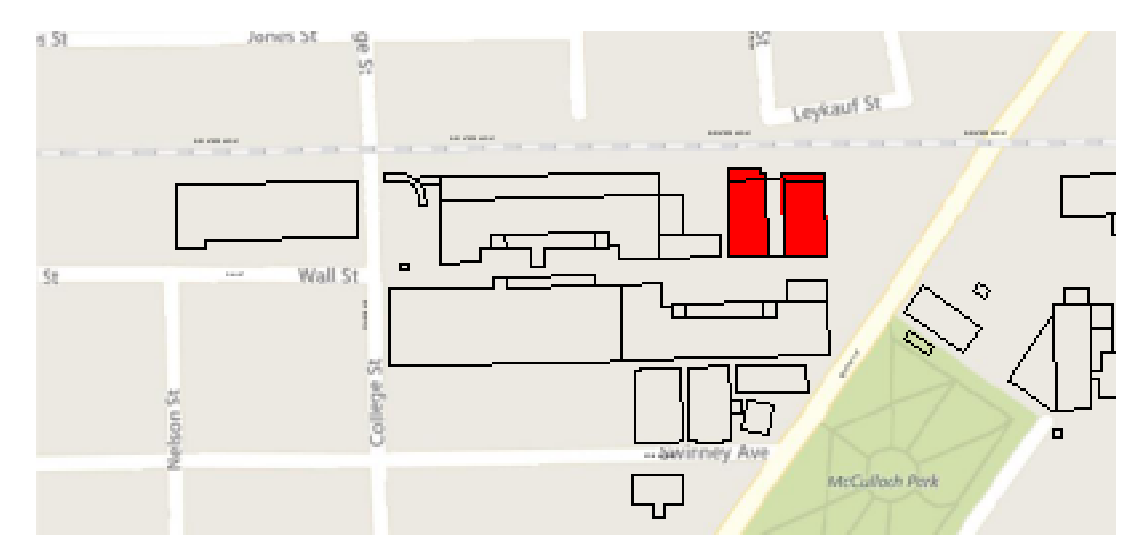
VAPOR INTRUSION MITIGATION PILOT TESTING FOR ELECTRIC WORKS PROPERTY (WEST CAMPUS)

LAYOUT BY:	DWS
CHECKED BY:	TS
DRAWN BY:	DWS
DATE:	2/1/2019
PROJECT NO.	CSP003
FIGURE	1



LEGEND

VP-#	SUB-SLAB MONITORING PIN
PVE-#	VAPOR MITIGATION PILOT STUDY EXTRACTION POINT
(line)	APPROXIMATE RADIUS OF -0.004 INCHES OF WATER VACUUM INFLUENCE
(0.010)	VACUUM IN INCHES OF WATER



SITE PLAN BUILDING KEY

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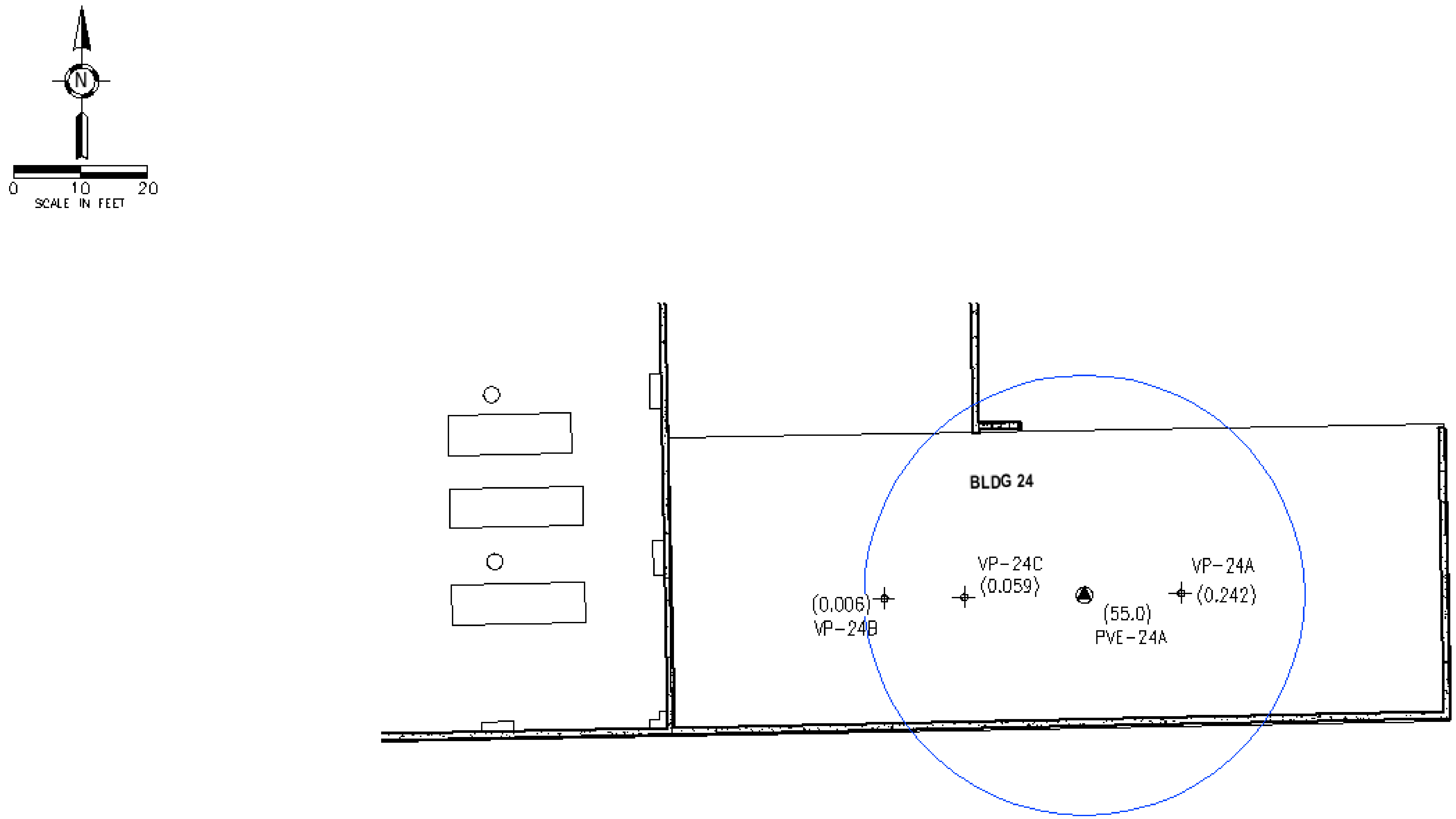
BUILDINGS 20 & 22
VACUUM INFLUENCE DIAGRAM

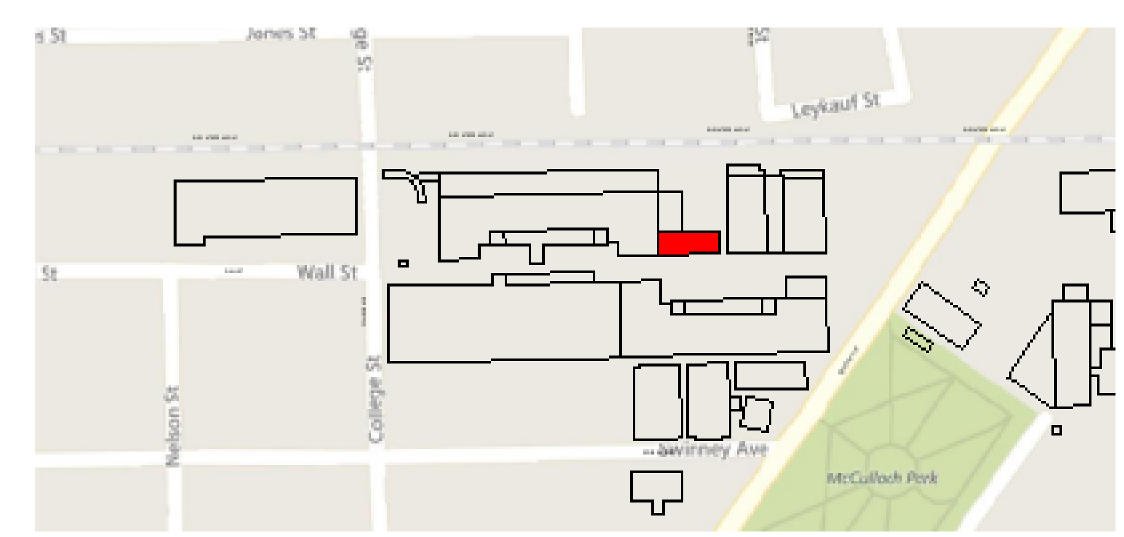
VAPOR INTRUSION MITIGATION
PILOT TESTING FOR
ELECTRIC WORKS PROPERTY
(WEST CAMPUS)

LAYOUT BY: DWS
CHECKED BY: TS
DRAWN BY: DWS
DATE: 2/1/2019
PROJECT NO. CSP003
FIGURE 2



LEGEND

VP-#	SUB-SLAB MONITORING PIN
PVE-#	VAPOR MITIGATION PILOT STUDY EXTRACTION POINT
(blue line)	APPROXIMATE RADIUS OF -0.004 INCHES OF WATER VACUUM INFLUENCE
(0.010)	VACUUM IN INCHES OF WATER



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BUILDING 24
VACUUM INFLUENCE DIAGRAM

VAPOR INTRUSION MITIGATION
PILOT TESTING FOR
ELECTRIC WORKS PROPERTY
(WEST CAMPUS)

LAYOUT BY: DWS
CHECKED BY: TS
DRAWN BY: DWS
DATE: 2/1/2019
PROJECT NO. CSP003
FIGURE 3

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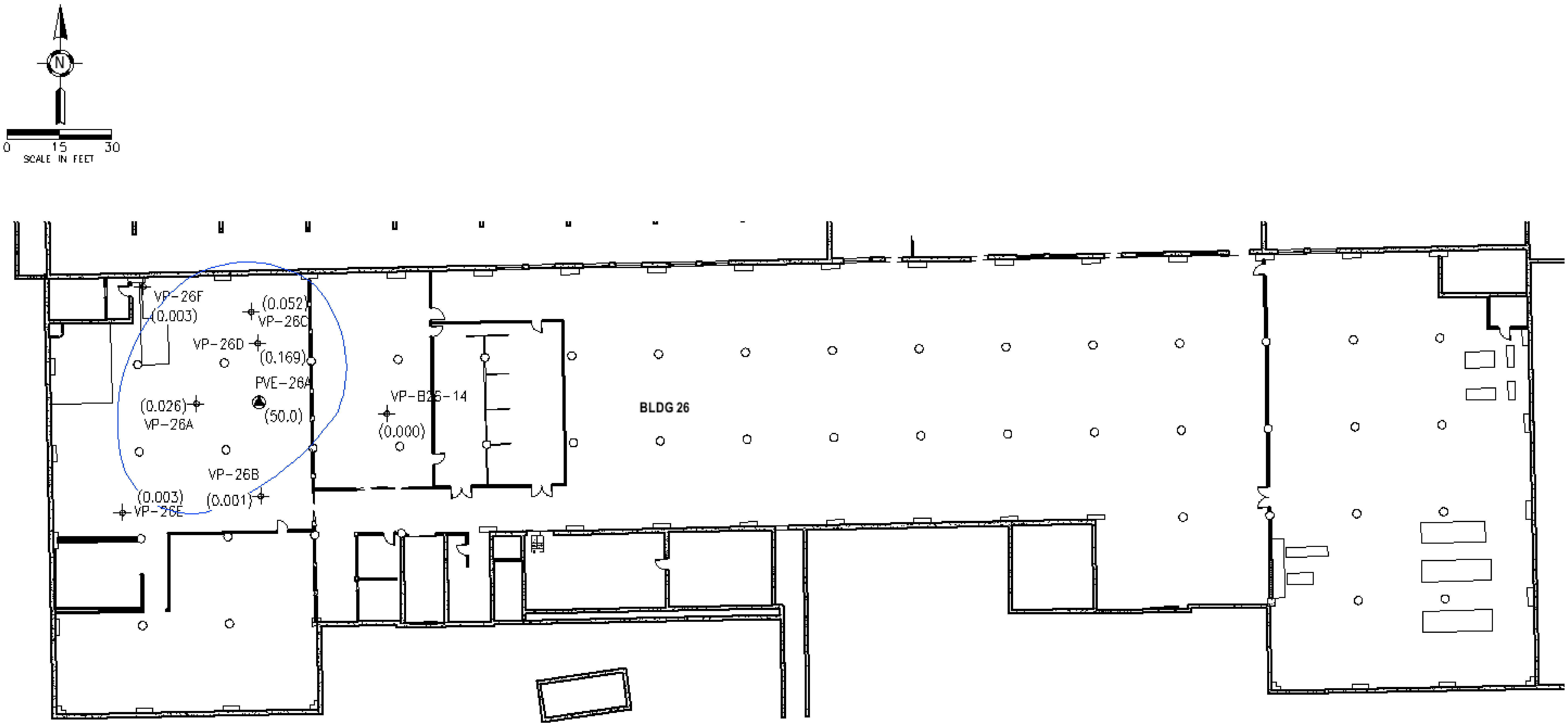
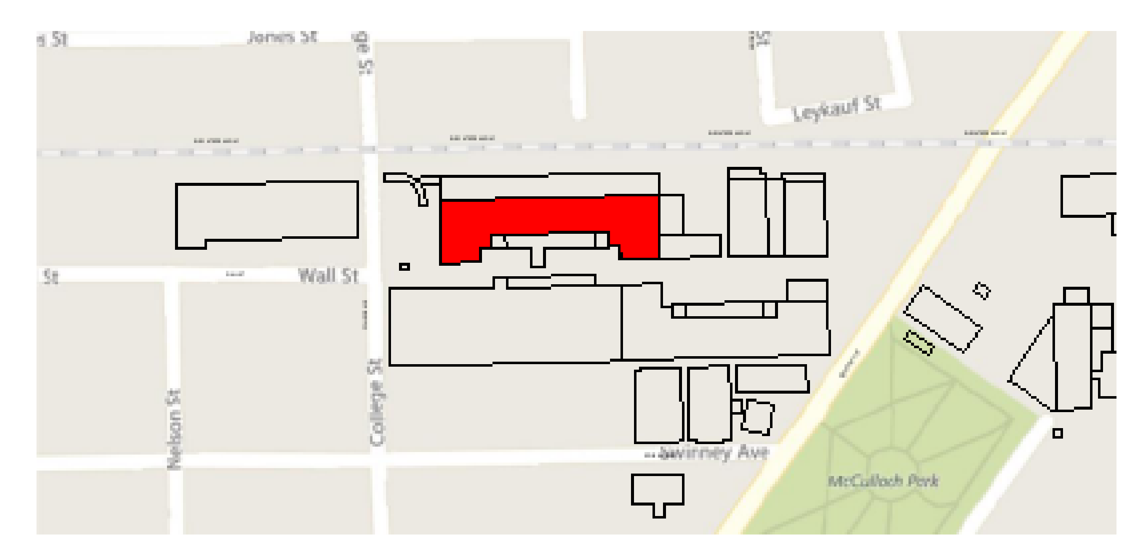


LEGEND

VP-#	SUB-SLAB MONITORING PIN
PVE-#	VAPOR MITIGATION PILOT STUDY EXTRACTION POINT
	APPROXIMATE RADIUS OF -0.004 INCHES OF WATER VACUUM INFLUENCE
(0.010)	VACUUM IN INCHES OF WATER



SITE PLAN BUILDING KEY

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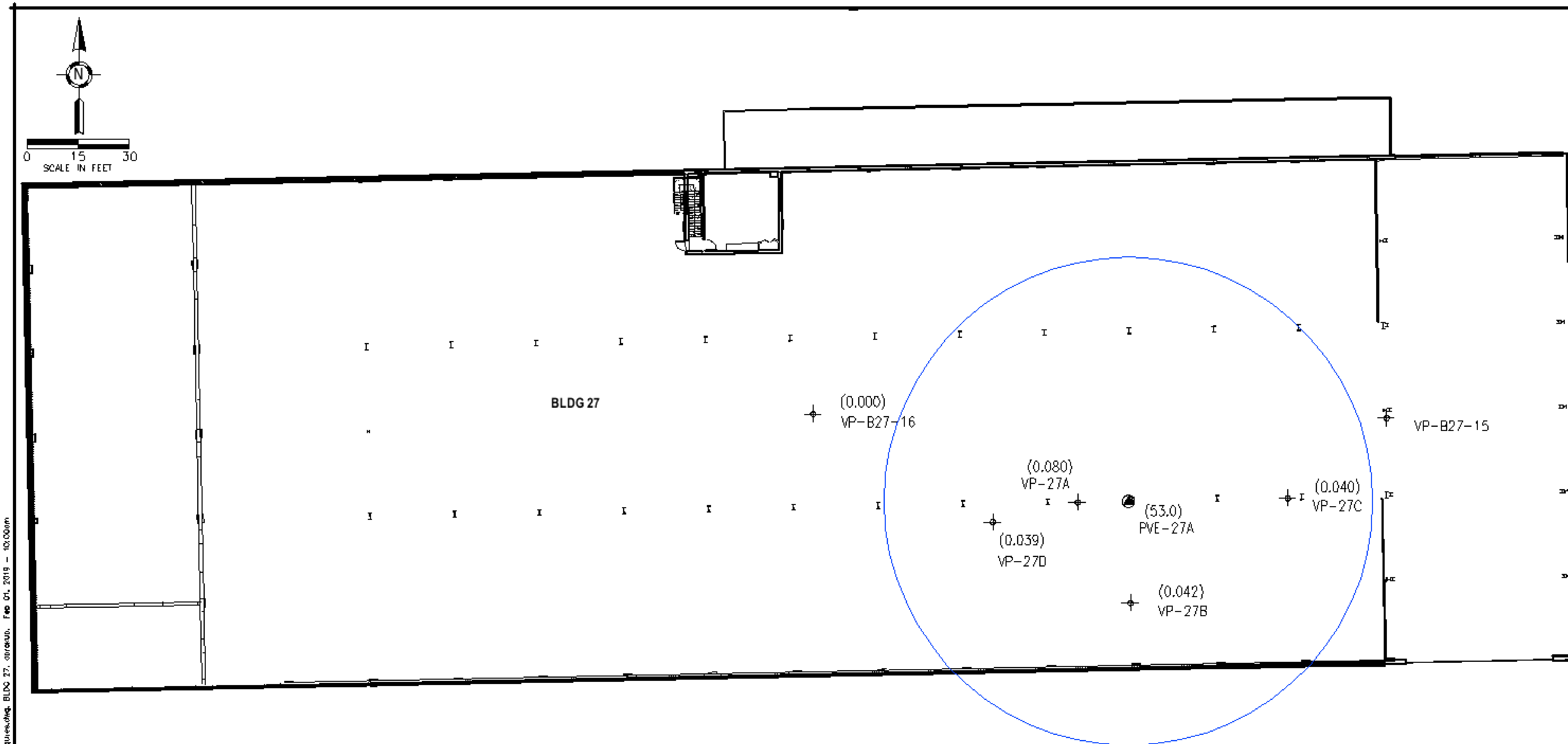
BUILDING 26
VACUUM INFLUENCE DIAGRAM

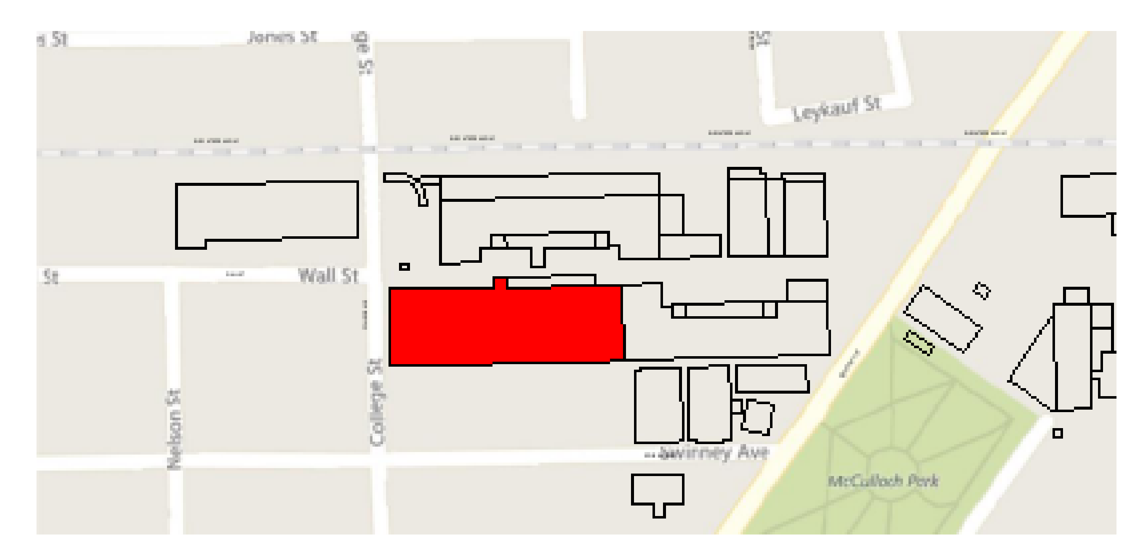
VAPOR INTRUSION MITIGATION
PILOT TESTING FOR
ELECTRIC WORKS PROPERTY
(WEST CAMPUS)

LAYOUT BY: DWS
CHECKED BY: TS
DRAWN BY: DWS
DATE: 2/1/2019
PROJECT NO. CSP003
FIGURE 4



LEGEND

VP-#	SUB-SLAB MONITORING PIN
PVE-#	VAPOR MITIGATION PILOT STUDY EXTRACTION POINT
	APPROXIMATE RADIUS OF -0.004 INCHES OF WATER VACUUM INFLUENCE
(0.010)	VACUUM IN INCHES OF WATER



SITE PLAN BUILDING KEY

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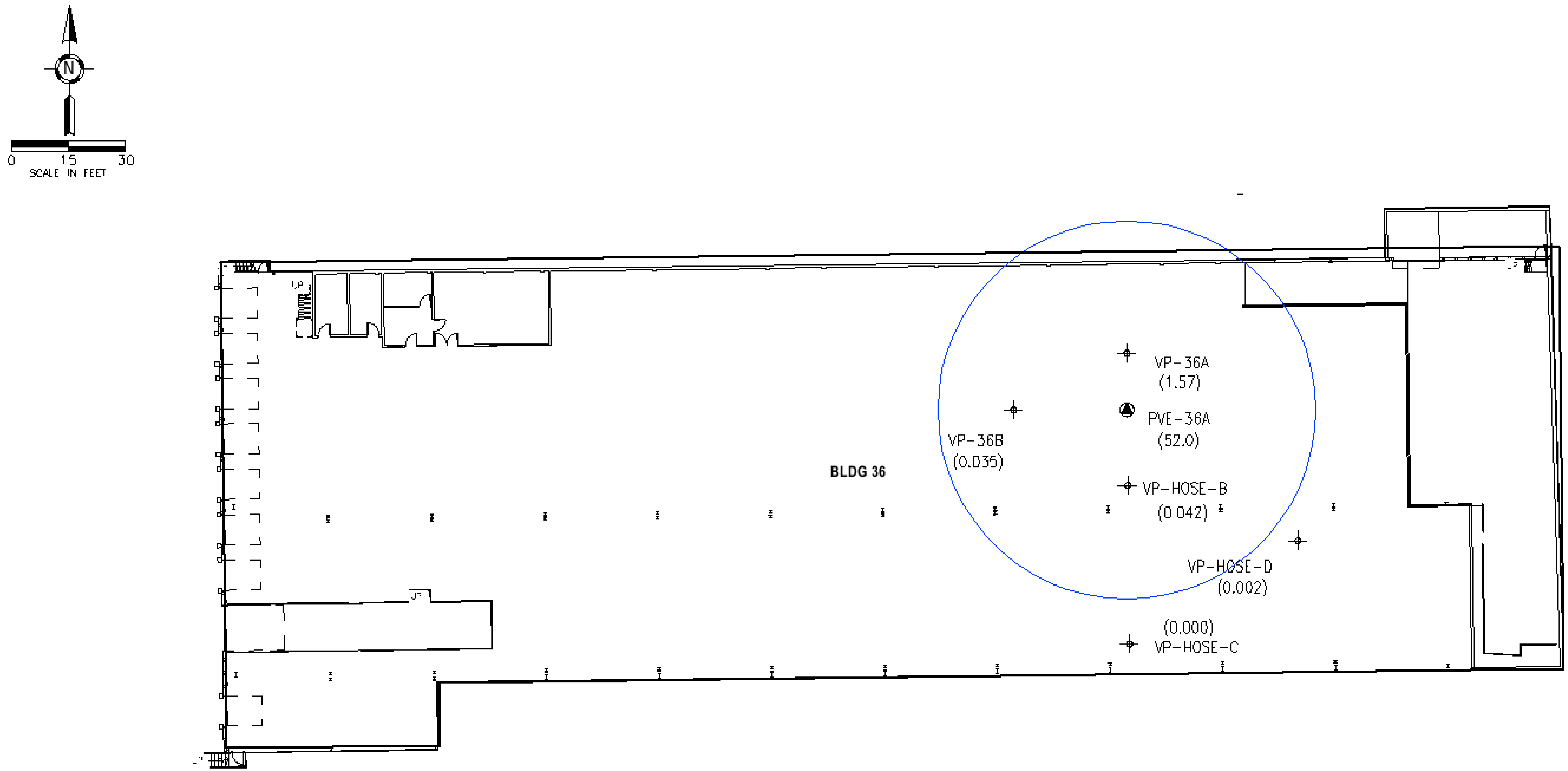
BUILDING 27
VACUUM INFLUENCE DIAGRAM

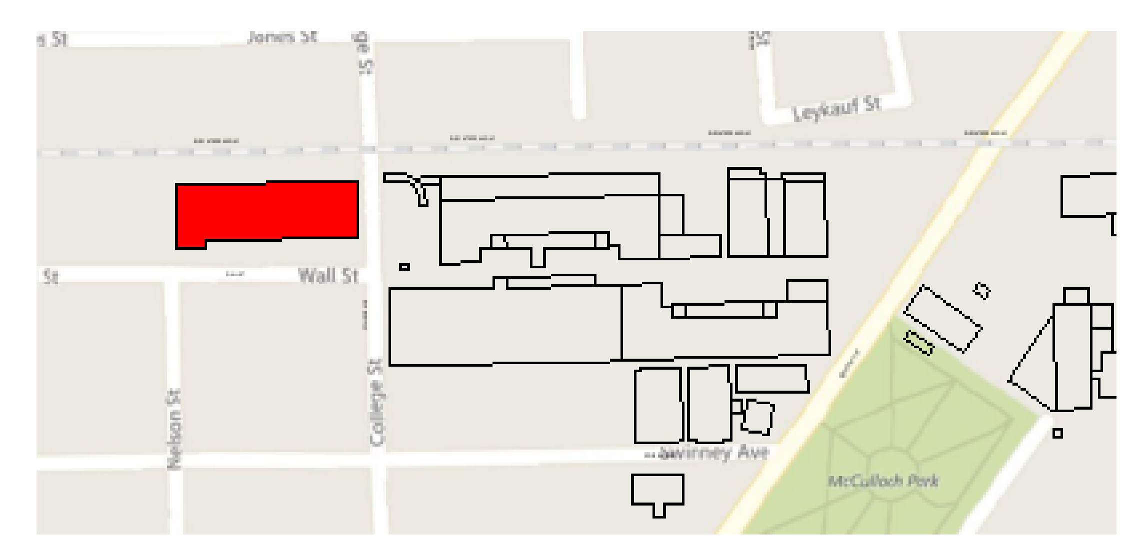
VAPOR INTRUSION MITIGATION
PILOT TESTING FOR
ELECTRIC WORKS PROPERTY
(WEST CAMPUS)

LAYOUT BY: DWS
CHECKED BY: TS
DRAWN BY: DWS
DATE: 2/1/2019
PROJECT NO. CSP003
FIGURE 5



LEGEND

VP-#	SUB-SLAB MONITORING PIN
PVE-#	VAPOR MITIGATION PILOT STUDY EXTRACTION POINT
VP-HOSE	SUB-SLAB MONITORING POINT (PREVIOUSLY INSTALLED BY OTHERS)
	APPROXIMATE RADIUS OF -0.004 INCHES OF WATER VACUUM INFLUENCE
(0.010)	VACUUM IN INCHES OF WATER



SITE PLAN BUILDING KEY

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BUILDING 36
VACUUM INFLUENCE DIAGRAM

VAPOR INTRUSION MITIGATION
PILOT TESTING FOR
ELECTRIC WORKS PROPERTY
(WEST CAMPUS)

LAYOUT BY: DWS
CHECKED BY: TS
DRAWN BY: DWS
DATE: 2/1/2019
PROJECT NO. CSP003
FIGURE 8

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ATTACHMENT A

Pilot Study Field Data

Test Location	B20
Personnel	T. Smith; Ted W.; Jeff H.

MONITORING DATA

						Vacuum Monitoring Points					
Date	Time	EX-Point Vacuum	Blower PID	EX-Point velocity	EX-Point flow	VP-2	VP-3	VP-A	TVP-B		Notes
		" H2O	PPM	ft/min	CFM	" H2O	" H2O	" H2O	" H2O		
5/7/18	12:30					0.001	0.0000	0.0000	0.000		Background
	12:40	50.0	1.5	2425	52.9	0.004	0.0123	0.131	0.048		
	13:10	49.0	1.5	2890	63.0	0.040	0.0110	0.1280	0.0490		
	13:50	49.0	1.6	2461	53.6	0.034	0.0110	0.1220	0.0470		
	14:20	49.0	1.4	2750	60.0	0.035	0.0100	0.1310	0.0510		
	14:55	49.0	1.4	2526	55.1	0.041	0.0090	0.1300	0.0470		
	15:25	49.0	1.4	2456	53.5	0.039	0.0080	0.1300	0.0490		
	15:55	49.0	1.3	2339	51.0	0.042	0.0100	0.1290	0.0480		
	16:30	35.0	0.8	1594	34.7	0.031	0.0060	0.1030	0.0370		Step Test 1
	16:40	23.0	0.4	1138	24.8	0.023	0.0045	0.0630	0.0240		Step Test 2
	16:50	10.0	0.1	646	14.1	0.062	0.0025	0.0250	0.0120		Step Test 3

SAMPLING DATA

Date	Time	Location	Sample ID	Sample Parameters/Notes
5/7/18	16:00	B20	A050718	TO-15

Test Location B22

Personnel Ted W. Jeff H.

MONITORING DATA

Date	Time	EX-Point Vacuum	Blower PID	EX-Point velocity	EX-Point flow	Vacuum Monitoring Points VP-1	VP-A	VP-B	VP-C	VP-D		Notes
		" H2O	PPM	ft/min	CFM	" H2O	" H2O	" H2O	" H2O	" H2O		
5/8/18	8:00		0.0			0.008	0.000	0.000	0.000	0.000		Background
	8:35	20.0	2.1	3826	83.4	0.394	0.160	0.215	n/a	n/a		
	9:00	20.0	2.3	3845	83.8	0.386	0.157	0.213	n/a	n/a		
	9:25	20.0	2.5	3832	83.5	0.390	0.160	0.214	n/a	n/a		
	9:45	20.0	2.6	4036	88.0	0.392	0.161	0.214	0.0282	n/a		
	10:05	20.0	2.7	3986	86.9	0.392	0.159	0.213	0.0274	0.0115		
	10:30	20.0	2.7	3837	83.6	0.392	0.160	0.215	0.0278	0.0116		
	11:00	20.0	2.9	3956	86.2	0.394	0.161	0.214	0.0285	0.0119		
	11:10	15.0	2.5	3024	65.9	0.313	0.127	0.171	0.0215	0.0089		Step Test 1
	11:15	10.0	1.9	2180	47.5	0.208	0.086	0.118	0.0151	0.0065		Step Test 2
	11:20	5.0	1.0	1124	24.5	0.089	0.038	0.053	0.0063	0.0029		Step Test 3

SAMPLING DATA

Date	Time	Location	Sample ID	Sample Parameters/Notes
5/8/18	11:05	B22EWEFF	A050818	TO-15

Test Location B24

Personnel Ted W. Jeff H.

MONITORING DATA

Date	Time	EX-Point Vacuum	Blower PID	EX-Point velocity	EX-Point flow	VP-A	VP-B	VP-C			Notes
						Vacuum Monitoring Points					
		" H2O	PPM	ft/min	CFM	" H2O	" H2O	" H2O			
5/8/18	12:10					0.000	0.0000	0.0000			Background
	12:30	55.0	11.3	690	15.0	0.247	0.0050	n/a			Actual Reading
	12:50	55.0	12.1	495	10.8	0.242	0.0070	0.0590			
	13:10	55.0	12.1	508	11.1	0.240	0.0060	0.0580			
	13:40	55.0	12.1	507	11.1	0.242	0.0064	0.0594			
	14:00	55.0	11.9	726	15.8	0.242	0.0056	0.0598			
	14:20	55.0	11.9	547	11.9	0.241	0.0061	0.0589			
	14:40	55.0	11.9	542	11.8	0.243	0.0058	0.0585			
	14:55	41.0	1.7	1998	43.6	0.192	0.0050	0.0476			Step Test 1
	15:05	28.0	0.9	1192	26.0	0.132	0.0031	0.0320			Step Test 2
	15:10	15.0	0.5	844	18.4	0.066	0.0021	0.0170			Step Test 3

SAMPLING DATA

Date	Time	Location	Sample ID	Sample Parameters/Notes
5/8/18	14:45	B24EWEFF	A050818	TO-15

Test Location B26 (Day 1)

Personnel Ted W. Jeff H.

MONITORING DATA

						Vacuum Monitoring Points							
Date	**Time**	**EX-Point Vacuum**	**Blower PID**	**EX-Point velocity**	**EX-Point flow**	**VP-A**	**VP-B**	**VP-14**	**VP-13**	**VP-C**	**CP-D**		**Notes**
		" H2O	PPM	ft/min	CFM	" H2O	" H2O	" H2O	" H2O	" H2O	" H2O		
5/9/18	8:35					0.000	0.000	0.000	0.000	0.000	0.000		Background
	9:00	52.0	0.4	1296	28.3	0.027	0.0020	0.003	0.000				
	9:25	52.0	0.2	1225	26.7	0.027	0.0006	0.0030	0.000	0.012			
	9:45	52.0	0.2	1178	25.7	0.026	0.0010	0.0030	0.000	0.016	0.0660		
	10:10	52.0	0.2	1245	27.1	0.026	0.0000	0.0030	0.000	0.019	0.065		
	10:35	52.0	0.2	1165	25.4	0.026	0.0006	0.0040	0.000	0.028	0.06		
	11:05	52.0	0.2	1206	26.3	0.028	0.0006	0.0050	0.000	0.026	0.064		
	11:25	52.0	0.2	1161	25.3	0.026	0.0007	0.0037	0.000	0.024	0.062		
	11:35	39.0	0.1	948	20.7	0.019	0.0009	0.0032	0.000	0.019	0.046		Step Test 1
	11:40	30.0	0.1	705	15.4	0.010	0.0003	0.0032		0.039	0.03		Step Test 2
	11:45	14.0		663	14.5	0.003	0.0000	0.0029		0.020	0.015		Step Test 3

SAMPLING DATA

Date	**Time**	**Location**	**Sample ID**	**Sample Parameters/Notes**
5/9/18	11:30	B26EWEFF	A050918	TO-15

Test Location B26 (Day 2)
Personnel Ted W. Jeff H.

MONITORING DATA

						Vacuum Monitoring Points								
Date	**Time**	**EX-Point Vacuum**	**Blower PID**	**EX-Point velocity**	**EX-Point flow**	**VP-A**	**VP-B**	**VP-C**	**CP-D**	**VP-E**	**VP-F**	**VP-14**		**Notes**
		" H2O	PPM	ft/min	CFM	" H2O	" H2O	" H2O	" H2O	" H2O	" H2O	" H2O	" H2O	
5/10/18	8:40							0.005	0.000	0.000	0.000	0		Background
	9:15	50.0	0.10	1270	27.7	0.026	0.001	0.015	0.046	0.003	0.0036	0.003		
	9:35	50.0	0.20	1369	29.8	0.026	0.001	0.018	0.042	0.003	0.0040	0.001		
	10:05	50.0	0.20	1301	28.4	0.027	0.000	0.009	0.040	0.003	0.0029	0.003		
	10:25	50.0	0.30	1375	30.0	0.026	0.001	0.010	0.041	0.003	0.0021	0.002		
	10:40	39.0	0.30	958	20.9	0.019	0.000	0.004	0.030	0.003	0.001	0.002		Step Test 1
	10:45	30.0	0.20	731	15.9	0.013	0.000	0.003	0.022	0.002	0.001	0.000		Step Test 2
	10:50	14.0	0.20	645	14.1	0.004	0.000	0.007	0.010	0.000	0.001	0.000		Step Test 3

SAMPLING DATA

Date	Time	Location	Sample ID	Sample Parameters/Notes

Test Location	B27
Personnel	Ted W. Jeff H.

MONITORING DATA

Date	Time	EX-Point Vacuum	Blower PID	EX-Point velocity	EX-Point flow	Vacuum Monitoring Points VP-A	VP-B	VP-C	VP-15	VP-16	VP-D		Notes
		" H2O	PPM	ft/min	CFM	" H2O	" H2O	" H2O	" H2O	" H2O	" H2O	" H2O	
5/9/18	13:20												Background
	13:50	56.0	1.90	1205	26.3	0.086	0.042						
	14:05	56.0	2.10	969	21.1	0.059	0.036	0.015					
	14:25	53.0	2.50	1156	25.2	0.084	0.044	0.025	0.003	0.000			
	14:45	53.0	2.30	1091	23.8	0.065	0.043	0.041	0.007	0.000			
	15:20	53.0	2.40	1036	22.6	0.082	0.051	0.043	0.018	0.000	0.042		
	15:40	53.0	2.50	1137	24.8	0.088	0.014	0.046	0.028	0.000	0.046		
	16:00	53.0	2.50	1067	23.3	0.081	0.051	0.058	0.015	0.000	0.025		
	16:20	53.0	2.5	1052	22.9	0.065	0.0460	0.0260	0.019	0.000	0.041		
	16:30	40.0	0.9	901	19.6	0.060	0.0310	0.0170	0.023	0.000	0.035		Step Test 1
	16:35	28.0	0.5	650	14.2	0.038	0.0270	0.0100	0.010	0.000	0.029		Step Test 2
	16:40	16.0	0.2	929	20.3	0.0270	0.029	0.01300	0.016	0.000	0.007		Step Test 3

SAMPLING DATA

Date	Time	Location	Sample ID	Sample Parameters/Notes
5/9/18	16:25	B27	A050918	TO-15

Test Location B36

Personnel Ted W. Jeff H.

MONITORING DATA

						Vacuum Monitoring Points							
Date	Time	EX-Point Vacuum	Blower PID	EX-Point velocity	EX-Point flow	VP-A	VP-B	HOSE-A	HOSE-B	HOSE-C	HOSE-D		Notes
		" H2O	PPM	ft/min	CFM	" H2O	" H2O	" H2O	" H2O	" H2O	" H2O	" H2O	
5/10/18	12:30					0.000	0.000	0.0000	0.0000	0.0000	0.0000		Background
	13:20	55.00	0.00	687.5	15.0	1.559	0.043	0.0040	0.0410	0.0000	0.0010		
	13:40	55.00	0.00	1412.0	30.8	1.550	0.034	0.0040	0.0410	0.0010	0.0020		
	14:00	52.00	0.00	1097.0	23.9	1.540	0.042	0.0040	0.0410	0.0000	0.0020		
	14:20	52.00	0.10	991.0	21.6	1.550	0.037	0.0038	0.0420	0.0000	0.0020		
	14:40	52.00	0.00	1091.0	23.8	1.570	0.035	0.0045	0.0440	0.0000	0.0020		
	15:00	52.00	0.10	1427.0	31.1	1.570	0.042	0.0035	0.0420	0.0000	0.0000		
	15:20	52.00	0.10	1018.0	22.2	1.590	0.040	0.0043	0.0410	0.0000	0.0042		
	15:40	52.00	0.1	1027.0	22.4	1.600	0.0048	0.0053	0.0450	0.0000	0.0020		
	16:00	40.00	0.2	1078.0	23.5	1.280	0.0320	0.0035	0.0330	0.0000	0.0010		Step Test 1
	16:05	38.00	0.2	983.0	21.4	0.897	0.0230	0.0025	0.0250	0.0000	0.0000		Step Test 2
	16:10	18.0		1082	23.6	0.6100	0.016	0.0016	0.0169	0.0000	0.0000		Step Test 3

SAMPLING DATA

Date	Time	Location	Sample ID	Sample Parameters/Notes
5/10/18	15:45	B36	A051018	TO-15

ATTACHMENT B

Pilot Study Blower Effluent Air Sampling Results

APPENDIX C
TABLE 1A

FORMER GE ELECTRIC ENERGY FACILITY

BUILDINGS 20, 22, 24 VAPOR MITIGATION PILOT TESTING
BLOWER EFFLUENT VOC CONCENTRATIONS

Station Name	Units	CASNumber	B20EWEFF	B22EWEFF	B24EWEFF
Sample Date			5/7/2018	5/7/2018	5/7/2018
FieldSampleID			CSP003:B20EWEFF:A050718	CSP003:B22EWEFF:A050718	CSP003:B24EWEFF:A050718
TO-15					
1,1,1-Trichloroethane	µg/m3	71-55-6	4.9	3.2	34.4
1,1,2,2-Tetrachloroethane	µg/m3	79-34-5	<0.57	<0.73	<0.59
1,1,2-Trichloroethane	µg/m3	79-00-5	<0.45	<0.57	<0.45
1,1,2-Trichlorotrifluoroethane	µg/m3	76-13-1	<0.73	<0.93	<0.75
1,1-Dichloroethane	µg/m3	75-34-3	<0.42	<0.54	<0.43
1,1-Dichloroethene	µg/m3	75-35-4	<0.47	<0.6	<0.48
1,2,4-Trimethylbenzene	µg/m3	95-63-6	2.5	5.8	8.5
1,2-Dichloroethane	µg/m3	107-06-2	<0.39	<0.5	<0.4
1,2-Dichloropropane	µg/m3	78-87-5	<0.61	<0.77	<0.62
1,3-Butadiene	µg/m3	106-99-0	<0.41	<0.52	<0.42
2-Butanone	µg/m3	78-93-3	<0.4	<0.51	<0.41
2-Hexanone	µg/m3	591-78-6	<1.2	<1.5	<1.2
4-Ethyltoluene	µg/m3	622-96-8	<0.42	<0.54	5.6
4-Methyl-2-pentanone	µg/m3	108-10-1	<0.7	<0.9	<0.72
Acetone	µg/m3	67-64-1	66.9	77.2	59.7
Benzene	µg/m3	71-43-2	4.7	2.9	3.1
Benzyl Chloride	µg/m3	100-44-7	<0.47	<0.6	<0.48
Bromodichloromethane	µg/m3	75-27-4	<0.7	<0.9	<0.72
Bromomethane	µg/m3	74-83-9	<0.41	<0.53	<0.42
Carbon Disulfide	µg/m3	75-15-0	<0.35	<0.45	<0.36
Carbon Tetrachloride	µg/m3	56-23-5	4.8	<0.8	<0.64
Chlorobenzene	µg/m3	108-90-7	<0.35	<0.45	<0.36
Chloroethane	µg/m3	75-00-3	<0.4	<0.52	<0.41
Chloroform	µg/m3	67-66-3	80.2	26.5	51.3
Chloromethane	µg/m3	74-87-3	<0.27	<0.34	<0.27
cis-1,2-Dichloroethene	µg/m3	156-59-2	<0.68	<0.86	<0.69
cis-1,3-Dichloropropene	µg/m3	10061-01-5	<0.49	<0.62	<0.49
Cyclohexane	µg/m3	110-82-7	<0.45	5.6	1.7
Dibromochloromethane	µg/m3	124-48-1	<0.88	<1.1	<0.89
Dichlorodifluoromethane	µg/m3	75-71-8	<0.82	<1.1	2.1
Ethyl Acetate	µg/m3	141-78-6	24	20.7	25.3
Ethylbenzene	µg/m3	100-41-4	<0.34	3.1	3.3
m,p-Xylenes	µg/m3	179601-23-1	6.4	14	15.3
Methyl tert-Butyl Ether (MTBE)	µg/m3	1634-04-4	<1.3	<1.7	<1.3
Methylene Chloride	µg/m3	75-09-2	177	528	168
n-Heptane	µg/m3	142-82-5	32.5	17.9	14
n-Hexane	µg/m3	110-54-3	21.9	11.4	22.8
o-Xylene	µg/m3	95-47-6	2.1	4.7	5.1
Propylene	µg/m3	115-07-1	13	3.9	1.5
Styrene	µg/m3	100-42-5	<0.33	<0.42	<0.34
Tetrachloroethene	µg/m3	127-18-4	9.4	49.8	23.3
Tetrahydrofuran	µg/m3	109-99-9	<0.54	2.7	<0.55
Toluene	µg/m3	108-88-3	11.3	13.1	12.4
trans-1,2-Dichloroethene	µg/m3	156-60-5	<0.58	<0.75	<0.6
trans-1,3-Dichloropropene	µg/m3	10061-02-6	<0.83	<1.1	<0.85
Trichloroethene	µg/m3	79-01-6	10300	16000	133000
Trichlorofluoromethane	µg/m3	75-69-4	<0.83	<1.1	<0.84
Vinyl Chloride	µg/m3	75-01-4	<0.25	<0.32	<0.25
1,2,4-Trichlorobenzene	µg/m3	120-82-1	<1.9	<2.4	<1.9
1,2-Dichlorobenzene	µg/m3	95-50-1	<0.65	<0.82	<0.66
1,3,5-Trimethylbenzene	µg/m3	108-67-8	<0.82	<1	5.6
1,3-Dichlorobenzene	µg/m3	541-73-1	<0.92	<1.2	<0.94
1,4-Dichlorobenzene	µg/m3	106-46-7	<0.43	<0.55	<0.44
Bromoform	µg/m3	75-25-2	<1.4	<1.7	<1.4
Ethanol	µg/m3	64-17-5	137	213	150
Hexachlorobutadiene	µg/m3	87-68-3	<1.7	<2.2	<1.8
Isopropanol	µg/m3	67-63-0	25	30.8	19
Naphthalene	µg/m3	91-20-3	<1.2	<1.5	<1.2
Vinyl Acetate	µg/m3	108-05-4	1.9	<0.42	<0.34
1,2-Dichloro-1,1,2,2-tetrafluoroethane	µg/m3	76-14-2	<0.88	<1.1	<0.89
Ethylene Dibromide (EDB)	µg/m3	106-93-4	<0.66	<0.84	<0.67

APPENDIX C
TABLE 1B

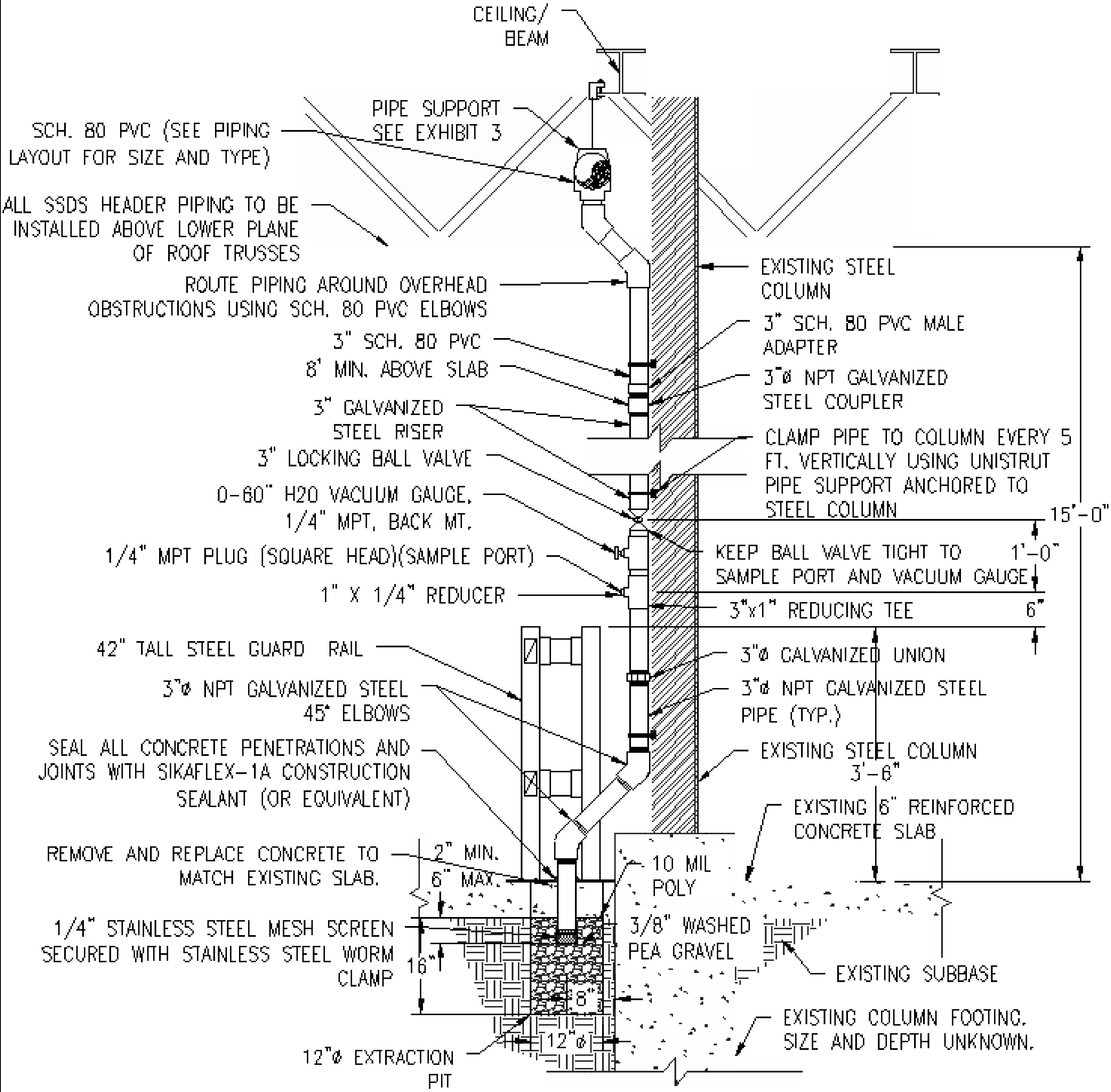
FORMER GE ELECTRIC ENERGY FACILITY

BUILDINGS 26, 27, 36 VAPOR MITIGATION PILOT TESTING
BLOWER EFFLUENT VOC CONCENTRATIONS

Station Name	Units	CAS Number	B26EWEFF	B27EWEFF	B36EWEFF
Sample Date			5/9/2018	5/9/2018	5/10/2018
Field Sample ID			CSP003:B26EWEFF:A050918	CSP003:B27EWEFF:A050918	CSP003:B36EWEFF:A051018
15					
1,1,1-Trichloroethane	µg/m3	71-55-6	12.2	8	<3
1,1,2,2-Tetrachloroethane	µg/m3	79-34-5	<1.4	<1.5	<1.9
1,1,2-Trichloroethane	µg/m3	79-00-5	<1.1	<1.2	<1.5
1,1,2-Trichlorotrifluoroethane	µg/m3	76-13-1	<3.2	<3.4	88.1
1,1-Dichloroethane	µg/m3	75-34-3	<1.7	<1.8	<2.2
1,1-Dichloroethene	µg/m3	75-35-4	<1.7	<1.8	<2.2
1,2,4-Trichlorobenzene	µg/m3	120-82-1	<7.8	<8.3	<10.3
1,2,4-Trimethylbenzene	µg/m3	95-63-6	5.9	6.9	8.5
1,2-Dichloro-1,1,2,2-tetrafluoroethane	µg/m3	76-14-2	<2.9	<3.1	<3.9
1,2-Dichlorobenzene	µg/m3	95-50-1	8.6 q	6.2 q	8.1 q
1,2-Dichloroethane	µg/m3	107-06-2	<0.85	<0.9	<1.1
1,2-Dichloropropane	µg/m3	78-87-5	<1.9	<2.1	<2.6
1,3,5-Trimethylbenzene	µg/m3	108-67-8	<2.1	2.4	3
1,3-Butadiene	µg/m3	106-99-0	<0.93	<0.99	<1.2
1,3-Dichlorobenzene	µg/m3	541-73-1	<2.5	<2.7	<3.3
1,4-Dichlorobenzene	µg/m3	106-46-7	10.3 q	7.8 q	9.4 q
2-Butanone	µg/m3	78-93-3	12.5	7.1	<8.2
2-Hexanone	µg/m3	591-78-6	<8.6	<9.1	<11.4
4-Ethyltoluene	µg/m3	622-96-8	<2.1	<2.2	<2.7
4-Methyl-2-pentanone	µg/m3	108-10-1	<8.6	<9.1	<11.4
Acetone	µg/m3	67-64-1	88.4	34	25.5
Benzene	µg/m3	71-43-2	5	5.5	8.2
Benzyl Chloride	µg/m3	100-44-7	<5.4	<5.8	<7.2
Bromodichloromethane	µg/m3	75-27-4	<2.8	<3	<3.7
Bromoform	µg/m3	75-25-2	<10.8	<11.5	<14.3
Bromomethane	µg/m3	74-83-9	<1.6	<1.7	<2.2
Carbon Disulfide	µg/m3	75-15-0	<1.3	<1.4	<1.7
Carbon Tetrachloride	µg/m3	56-23-5	2.3	<1.4	<1.7
Chlorobenzene	µg/m3	108-90-7	10.4	7.1	5.5
Chloroethane	µg/m3	75-00-3	<1.1	<1.2	<1.5
Chloroform	µg/m3	67-66-3	<1	89.8	<1.4
Chloromethane	µg/m3	74-87-3	1.2	<0.92	<1.1
cis-1,2-Dichloroethene	µg/m3	156-59-2	<1.7	<1.8	<2.2
cis-1,3-Dichloropropene	µg/m3	10061-01-5	<1.9	<2	<2.5
Cyclohexane	µg/m3	110-82-7	<1.4	5.5	8.2
Dibromochloromethane	µg/m3	124-48-1	<3.6	<3.8	<4.7
Dichlorodifluoromethane	µg/m3	75-71-8	2.4	6	21.5
Ethyl Acetate	µg/m3	141-78-6	105	61.5	8.1
Ethylene Dibromide (EDB)	µg/m3	106-93-4	<3.2	<3.4	<4.3
Ethanol	µg/m3	64-17-5	264	176	54.1
Ethylbenzene	µg/m3	100-41-4	3.5	4.2	4.5
Hexachlorobutadiene	µg/m3	87-68-3	<4.5	<4.8	<5.9
Isopropanol	µg/m3	67-63-0	35.1	41.8	27.4
m,p-Xylenes	µg/m3	179601-23-1	14.6	16.4	16.9
Methyl tert-Butyl Ether (MTBE)	µg/m3	1634-04-4	<7.5	<8	<10
Methylene Chloride	µg/m3	75-09-2	14.7	13.1	174
n-Heptane	µg/m3	142-82-5	28.7	41.4	65.4
n-Hexane	µg/m3	110-54-3	21.1	18.1	28.3
Naphthalene	µg/m3	91-20-3	<5.5	<5.8	<7.3
o-Xylene	µg/m3	95-47-6	5.2	5.8	6.3
Propylene	µg/m3	115-07-1	1.2	2.5	12
Styrene	µg/m3	100-42-5	<1.8	<1.9	<2.4
Tetrachloroethene	µg/m3	127-18-4	107	7.7	2.7
Tetrahydrofuran	µg/m3	109-99-9	<1.2	<1.3	<1.6
Toluene	µg/m3	108-88-3	43.4	37.3	44
trans-1,2-Dichloroethene	µg/m3	156-60-5	<1.7	<1.8	<2.2
trans-1,3-Dichloropropene	µg/m3	10061-02-6	<1.9	<2	<2.5
Trichloroethene	µg/m3	79-01-6	324	23400	104
Trichlorofluoromethane	µg/m3	75-69-4	<2.3	<2.5	<3.1
Vinyl Acetate	µg/m3	108-05-4	<1.5	<1.6	<2
Vinyl Chloride	µg/m3	75-01-4	<0.54	<0.57	<0.71

ATTACHMENT C

Full-Scale Vapor Mitigation Design Details



NOTES:

1. ALL EXCAVATED SUB-SLAB MATERIALS TO BE DRUMMED OR CONTAINERIZED AND CHARACTERIZED FOR PROPER DISPOSAL.
2. REINFORCING STEEL NOT SHOWN.
3. CONTRACTOR IS TO PREP AND COMPACT EXISTING SUBGRADE PRIOR TO PLACEMENT OF PEA GRAVEL AND CONCRETE. SUBGRADE SHALL BE COMPACTED TO 100% STANDARD PROCTOR.
4. CONTRACTOR TO USE 4000 PSI, 28 DAY COMPRESSIVE STRENGTH CONCRETE.

SCALE: N.T.S.

VAPOR INTRUSION MITIGATION PILOT TESTING ELECTRIC WORKS PROPERTY (WEST CAMPUS)	LAYOUT BY: AJP CHECKED BY: TS DRAWN BY: AJP DATE: 2/1/2019	PROJECT NO. CSP003 EXHIBIT 1

FORT WAYNE ALLEN COUNTY INDIANA	TYPICAL EXTRACTION POINT AND RISER DETAIL	HULL Environment / Energy / Infrastructure	6397 EMERALD PARKWAY SUITE 200 DUBLIN, OHIO 43016 PHONE: (614) 793-8777 FAX: (614) 793-9070 www.hullinc.com

F:\Clients\Active\CSP\CSP003\Design\Drawing\Exhibits\CSP003_VacDetails.dwg, EXHIBIT 1, aprokup, Feb 01, 2019 - 10:00am

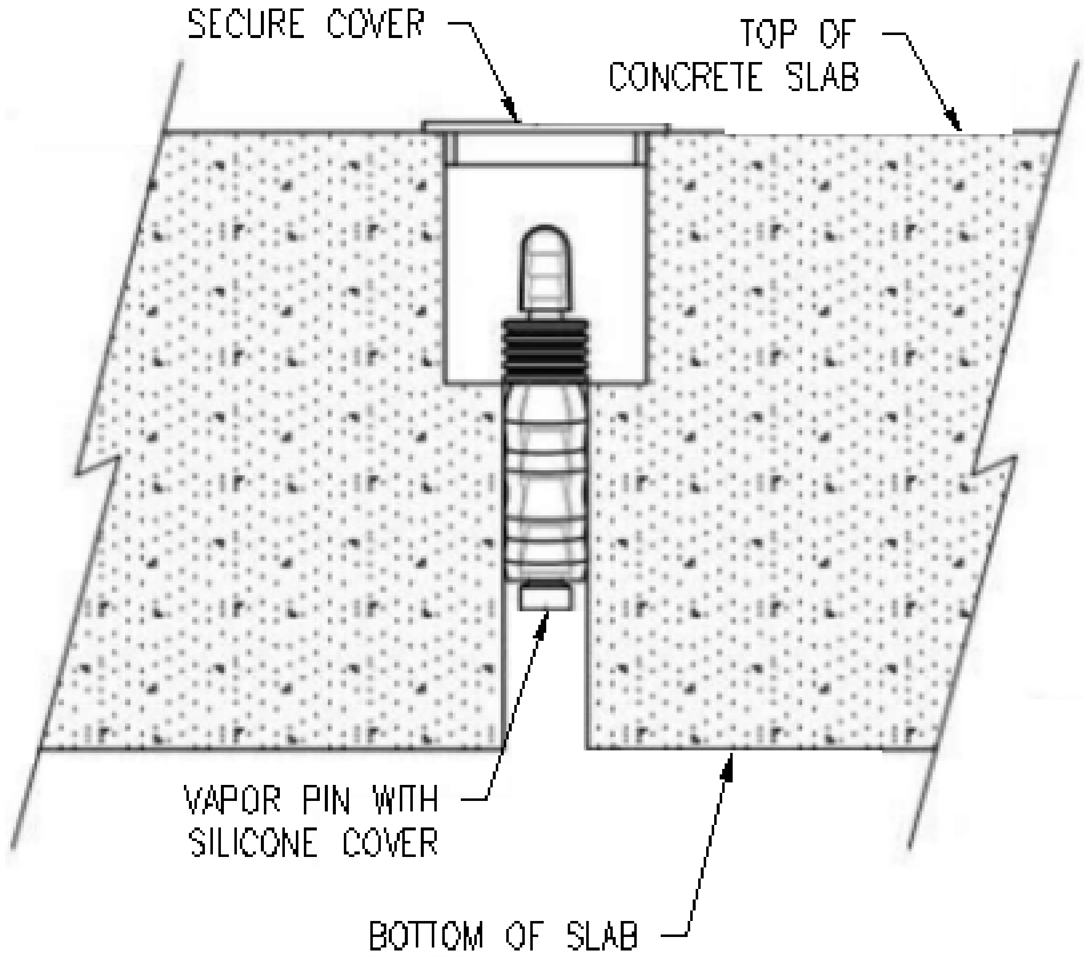
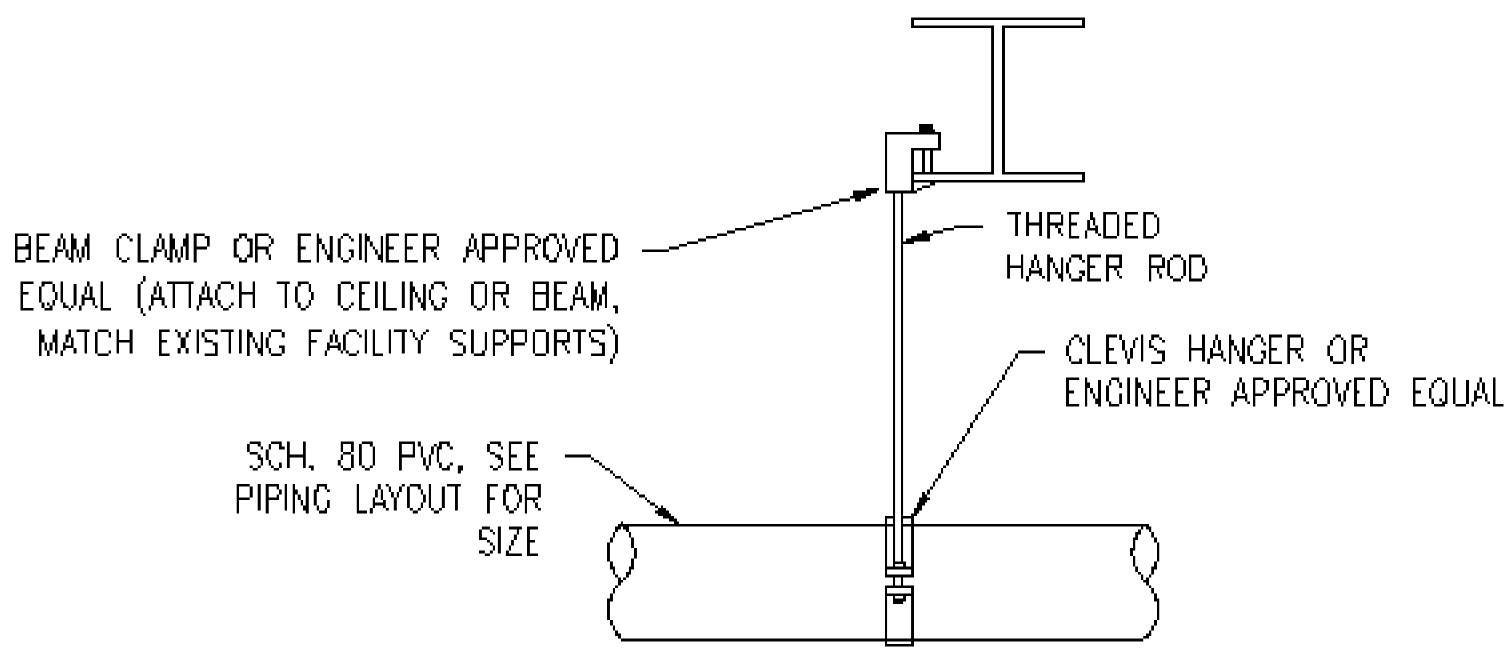


EXHIBIT 2: TYP. VAPOR PIN DETAIL



NOTES:

1. HORIZONTAL PIPING SHALL BE SUPPORTED A MINIMUM OF EVERY 10 FEET.
2. HORIZONTAL PIPING SHALL BE INSTALLED WITH 1% OR 0.5% SLOPE TO FACILITATE DRAINAGE OF CONDENSATE. REFER TO SHEET C5.0 FOR SLOPE PERCENT AND DIRECTION.

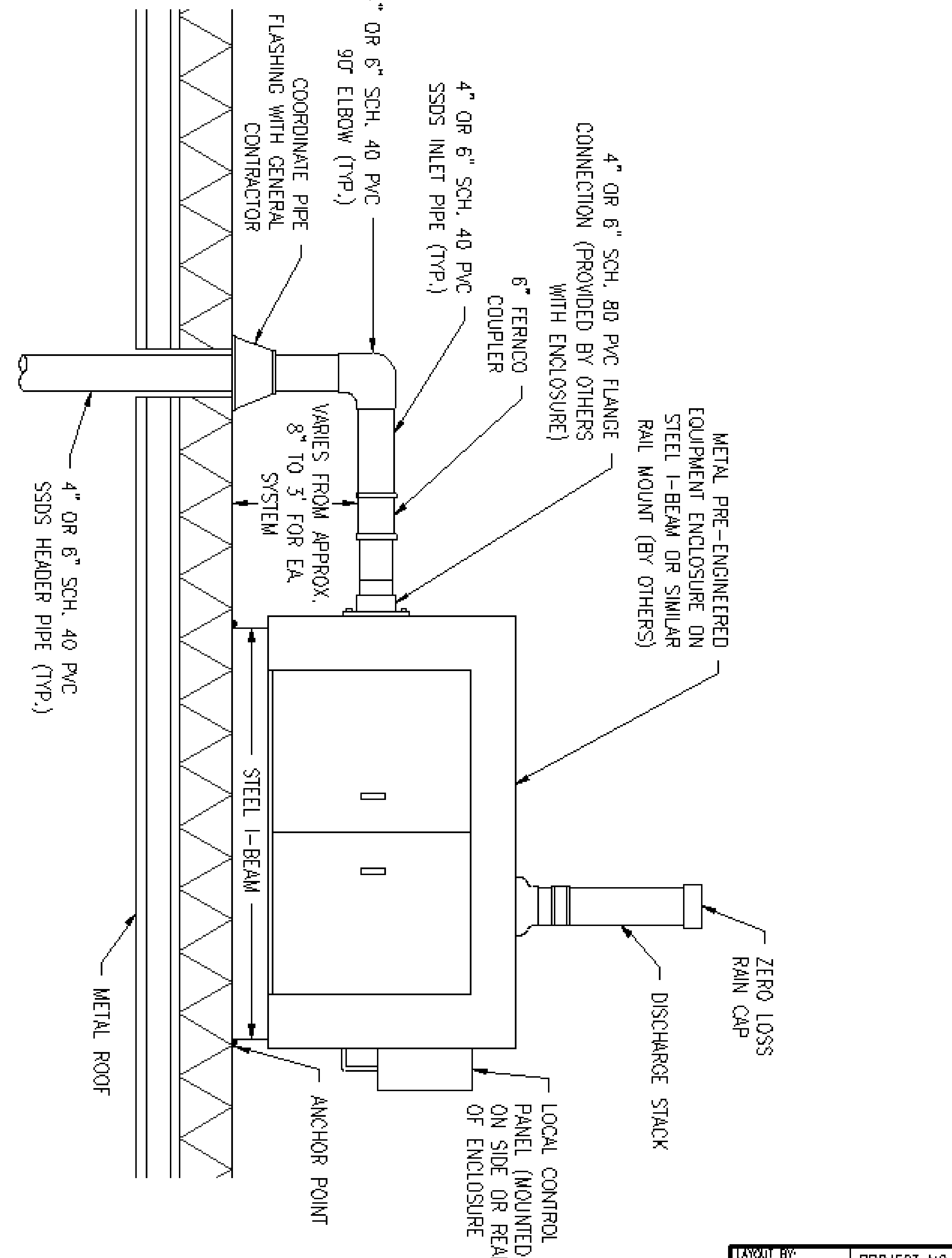
EXHIBIT 3: TYP. HANGING PIPE SUPPORT

SCALE: N.T.S.

LAYOUT BY: AJP	PROJECT NO. CSP003
CHECKED BY: TS	
DRAWN BY: AJP	EXHIBIT 2 & 3
DATE: 2/1/2019	

VAPOR INTRUSION MITIGATION PILOT TESTING
ELECTRIC WORKS PROPERTY (WEST CAMPUS)

FORT WAYNE ALLEN COUNTY INDIANA	TYP. VAPOR PIN DETAIL (TOP) TYP. HANGING PIPE SUPPORT (BOTTOM)	HULL Environment / Energy / Infrastructure	6397 EMERALD PARKWAY SUITE 200 DUBLIN, OHIO 43016 PHONE: (614) 793-8777 FAX. (614) 793-9070 www.hullinc.com



SCALE: N.T.S.

LAYOUT BY: AJP	PROJECT NO.
CHECKED BY: TS	CSP003
DRAWN BY: AJP	EXHIBIT
DATE: 2/1/2019	4

VAPOR INTRUSION MITIGATION PILOT TESTING
ELECTRIC WORKS PROPERTY (WEST CAMPUS)

FORT WAYNE
ALLEN COUNTY
INDIANA

TYPICAL VAPOR MITIGATION
EQUIPMENT ENCLOSURE

HULL
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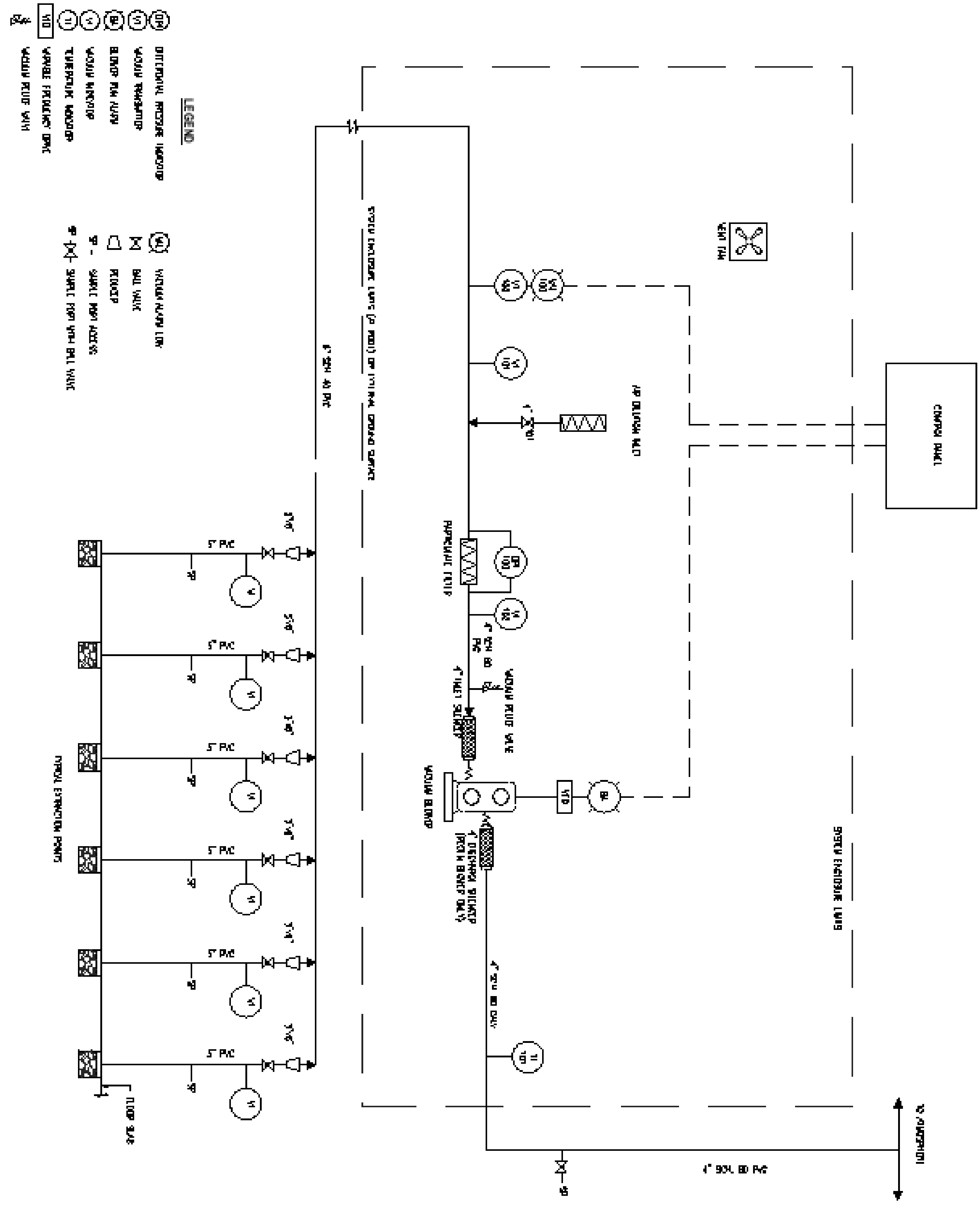

ATTACHMENT D

Estimated Air Emissions - Full-Scale Vapor Mitigation System

APPENDIX D

TABLE 1

FORMER GE ELECTRIC ENERGY FACILITY

ESTIMATED VOC EMISSIONS FROM FULL-SCALE VAPOR MITIGATION SYSTEM

		Building 20	Building 22	Building 24	Building 26	Building 27	Building 36	TOTAL ESTIMATED FACILITY EMISSIONS	
Parameter	Units	Pounds per Day	Pounds per Day	Pounds per Day	Pounds per Day	Pounds per Day	Pounds per Day	Pounds per Day	Tons per Year
1,1,1-Trichloroethane	ug/m 3	0.0001	0.0001	0.0005	0.0003	0.0002	0.0000	0.00	0.00
1,1,2-Trichlorotrifluoroethane	ug/m 3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0016	0.00	0.00
1,2,4-Trimethylbenzene	ug/m 3	0.0000	0.0001	0.0001	0.0002	0.0002	0.0002	0.00	0.00
1,3,5-Trimethylbenzene	ug/m 3	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.00	0.00
2-Butanone	ug/m 3	0.0000	0.0000	0.0000	0.0003	0.0002	0.0000	0.00	0.00
2-Propanol	ug/m 3	0.0003	0.0007	0.0003	0.0000	0.0000	0.0000	0.00	0.00
Acetone	ug/m 3	0.0009	0.0017	0.0009	0.0024	0.0008	0.0005	0.01	0.00
Benzene	ug/m 3	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.00	0.00
Carbon Tetrachloride	ug/m 3	0.0001	0.0000	0.0000	0.0001	0.0000	0.0000	0.00	0.00
Chlorobenzene	ug/m 3	0.0000	0.0000	0.0000	0.0003	0.0002	0.0001	0.00	0.00
Chloroform	ug/m 3	0.0011	0.0006	0.0007	0.0000	0.0020	0.0000	0.00	0.00
Chloromethane	ug/m 3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.00	0.00
Cyclohexane	ug/m 3	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.00	0.00
Dichlorodifluoromethane	ug/m 3	0.0000	0.0000	0.0000	0.0001	0.0001	0.0004	0.00	0.00
Ethyl Acetate	ug/m 3	0.0003	0.0004	0.0004	0.0028	0.0014	0.0001	0.01	0.00
Ethanol	ug/m 3	0.0018	0.0046	0.0022	0.0071	0.0040	0.0010	0.02	0.00
Ethylbenzene	ug/m 3	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.00	0.00
Isopropanol	ug/m 3	0.0000	0.0000	0.0000	0.0009	0.0009	0.0005	0.00	0.00
m,p-Xylenes	ug/m 3	0.0001	0.0003	0.0002	0.0004	0.0004	0.0003	0.00	0.00
Methylene Chloride	ug/m 3	0.0024	0.0011	0.0024	0.0004	0.0003	0.0031	0.01	0.00
n-Heptane	ug/m 3	0.0004	0.0004	0.0002	0.0008	0.0009	0.0012	0.00	0.00
n-Hexane	ug/m 3	0.0003	0.0002	0.0003	0.0006	0.0004	0.0005	0.00	0.00
o-Xylene	ug/m 3	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.00	0.00
Propylene	ug/m 3	0.0002	0.0001	0.0000	0.0000	0.0001	0.0002	0.00	0.00
Tetrachloroethene	ug/m 3	0.0001	0.0011	0.0003	0.0029	0.0002	0.0000	0.00	0.00
Toluene	ug/m 3	0.0002	0.0003	0.0002	0.0012	0.0008	0.0008	0.00	0.00
Trichloroethene	ug/m 3	0.1389	0.3452	1.9132	0.0087	0.5260	0.0019	2.93	0.54
Vinyl Acetate	ug/m 3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.00	0.00
TOTAL BUILDING EMISSIONS		0.1473	0.3571	1.9220	0.0299	0.5394	0.0129	**3.01**	**0.55**

1. Emissions are based on air samples collected during the May 2017 pilot testing. Parameters below detection limits are not included in this table.
2. Emission estimates assume continuous operations of mitigation system. Assumes flowrates as follows: Building 20 = 150 CFM, Building 22 = 240 CFM, Building 24 = 160 CFM, Building 26 = 300 CFM; Building 27 = 250 CFM, Building 36 = 200 CFM
3. Pounds per day calculated as follows: (xxxft^3/min) x (1440 min/day) x (1 m^3/35.31 ft^3) x (1 gram/10^^{6} ug) x (## ug/m^3) x (1lb/453.6 gram).
4. Tons per year calculated as follows: (xx lbs/day) x (365 days/yr.) x (1 ton/2000 lbs)