Soil Vapor Intrusion Evaluation

For

CMS ASSOCIATES REMEDIATION SITE
210 French Road Building

Site no. 915168

210 French Road
Town of Cheektowaga
Erie County NY

September 2014

Prepared for:

CMS Property Associates, LLC
228 Linwood Avenue
Buffalo NY 14209

Ken W. Kloeber
Consulting Engineers ENVIRONMENTAL SOLUTIONS • CIVIL & SANITARY ENGINEERING • PLANNING & DESIGN

PO BOX 140 • BOSTON NY 14025 • 716-864-0012 • Fax 775-860-3804 • KloeberEng@aol.com

SOIL VAPOR INTRUSION EVALUATION

for

CMS ASSOCIATES REMEDIATION SITE
210 French Road Building

Site no. 9-15-168

210 French Road
Town of Cheektowaga
Erie County NY

Prepared for:

CMS Property Associates, LLC
228 Linwood Avenue
Buffalo NY 14209

By:

Ken W. Kloeber Consulting Engineers
PO Box 140
Boston NY 14025-0140
KloeberEng@aol.com

Septembert 2014

TABLE of CONTENTS

I INTRODUCTION

1.1 Purpose of this Soil Vapor Intrusion Evaluation 1

Table 1 Primary Constituents of Leaking UST 1
Figure 1 Site Location 2
Figure 2 Building Location 4

1.2 Findings 3

1.3 Recommendations 7

II POTENTIAL for SVI IMPACT in 210 FRENCH BUILDING

2.1 Prior Sub-Slab Vapor Investigations 8

2.1.1 2004 Investigation 8

Table 2 2004 Sub-slab Vapor VOC Concentrations 8
Figure 3 2004 Air Sample Locations 9
Table 3 2004 Indoor Air VOC Concentrations 10

2.1.2 2005 Investigation 10

Table 4 2005 Sub-Slab Vapor VOCs 10
Figure 4 2005 Air Sample Locations 11

2.2 Groundwater VOCs 12

Figure 5 Groundwater Monitoring Well Locations 13

2.3 2010-2011 SVI Investigations 14

Table 5 SVI Potential - Properties Surrounding CMS Remediation Site 15

III SVI INVESTIGATIONS

3.1 Investigation Methodology 16

3.2 Sampling Protocol 17

3.2.1 Sample Canisters and Flow Regulators 17

3.2.2 Indoor Air Sampling 17

Figure 6 Indoor Air Test Locations 18

3.2.3 Outdoor Ambient Air Sampling 19

3.2.4 Sub-Slab Probe Installation 19

Figure 7 Sub-Slab Sample Port Installation 20
Figure 8 Sub-Slab Vapor Sampling Assembly 21

TABLE of CONTENTS

3.2.5 Sub-Slab Screening 22

Figure 9 Sample Port Leak Test Assembly 23
Table 6 Sub-Slab Vapor Sampling Ports; Pre-Sample Leakage Tests 24

3.2.6 Sub-Slab Sampling 24

Figure 10 Sub-Slab Vapor Test Locations 25
Table 7 Sub-Slab Vapor Sampling Ports; Post-Sampling Leakage Tests 26

3.2.7 Floor Slab Remediation and Sub-Slab Communication Tests 27

IV SOIL VAPOR INTRUSION EVALUATION

4.1 SVIE Methodology and Analytical Protocol 28

4.1.1 Methodology 28

4.1.2 Analytical Protocol 29

NYSDOH Sub-Slab Vapor/Indoor Air Matrix 1 29
NYSDOH Sub-Slab Vapor/Indoor Air Matrix 2 29

4.2 Construction and Efficiency of Existing SSD Systems 30

Photo Plate 1 - East SSD System 31
Photo Plate 2 - West SSD System 32

4.3 2013 Remediation of Warehouse Concrete Floor Slab 33

4.4 Extent of Current SVI Remediation and Reduced-Pressure Zone 34

Figure 11 Remediation System Reduced Pressure Zone 35

4.5 Factors Affecting SVI and Indoor Are VOCs 34

4.5 Evaluation of Indoor Air and Sub-Slab Samples 36

TABLE of CONTENTS

APPENDICES *(on CD provided with hard copy)*

A **NYSDOH Indoor Air/Sub-Slab Vapor Decision Matrix**
Project Correspondence

B **Data Usability Summary Reports**

C **2010-2011 Sub-Slab Vapor TO-15 Results**

D **2013 Indoor and Outdoor Ambient Air ASP Level-B Data Package**
Con-Test Analytical Laboratory
Final Issued July 2013

E **2013 Sub-Slab Vapor ASP Level-B Data Package**
Con-Test Analytical Laboratory
Final Issued March 2014

F **2010-2011 Sub-Slab Vapor Test Field Work Sheets**

G **2013 SVI Test Field Work Sheets**

H **Evaluation of Performance - Existing SSD System**
Mitigation Tech, July 2013

J **Summary of 2013 Indoor-Air and Sub-Slab TO-15 Analytical Results**

APPENDIX A

NYSDOH Indoor Air/Sub-Slab Vapor Decision Matrix

Project Correspondence

(on CD provided with hard copy)

APPENDIX B

Data Usability Summary Reports

Vali-Data of WNY

(on CD provided with hard copy)

APPENDIX C

2010-2011 Sub-slab Vapor TO-15 Results

Enalytic Laboratory
Issued September 2011

(on CD provided with hard copy)

APPENDIX D

2013 Indoor and Outdoor Ambient Air ASP Level B Data Package

Con-Test Analytical Laboratory
Final Issued July 2013

(on CD provided with hard copy)

APPENDIX E

2013 Sub-Slab Vapor ASP Level B Data Package

Con-Test Analytical Laboratory
Final Issued March 2014

(on CD provided with hard copy)

APPENDIX F

2010-2011 Sub-Slab Vapor Test Field Work Sheets

(on CD provided with hard copy)

APPENDIX G

2013 SVI Test Field Work Sheets

(on CD provided with hard copy)

APPENDIX H

Evaluation of Performance - Existing SSD System

Mitigation Tech, July 2013

(on CD provided with hard copy)

APPENDIX J

Summary of 2013 Indoor Air and Sub Slab TO-15 Analytical Results

I INTRODUCTION

1.1 Purpose of this Soil Vapor Intrusion Evaluation

In 2004, CMS Property Associates, LLC, began to investigate potential soil vapor intrusion into the commercial building that is on the CMS groundwater remediation site at 210 French Road in the town of Cheektowaga; Erie County, NY. This most-recent *Soil Vapor Intrusion Evaluation* is a continuation of prior investigations and SVI mitigation in that building. The site is no. 9-15-168 on the NYS *Registry of Inactive Hazardous Waste Sites*, and was formerly owned by CMS Property Associates, LLC (see *Figure 1* for the site location.)

CMS removed a UST in the parking lot in March 1996, and the tank contents was tested and found to contain chlorinated VOCs that were properly disposed of before the tank was pulled (see Table 1.) While removing the UST however, the contractor discovered that it was compromised and its contents leaking into the surrounding soil.

Table 1

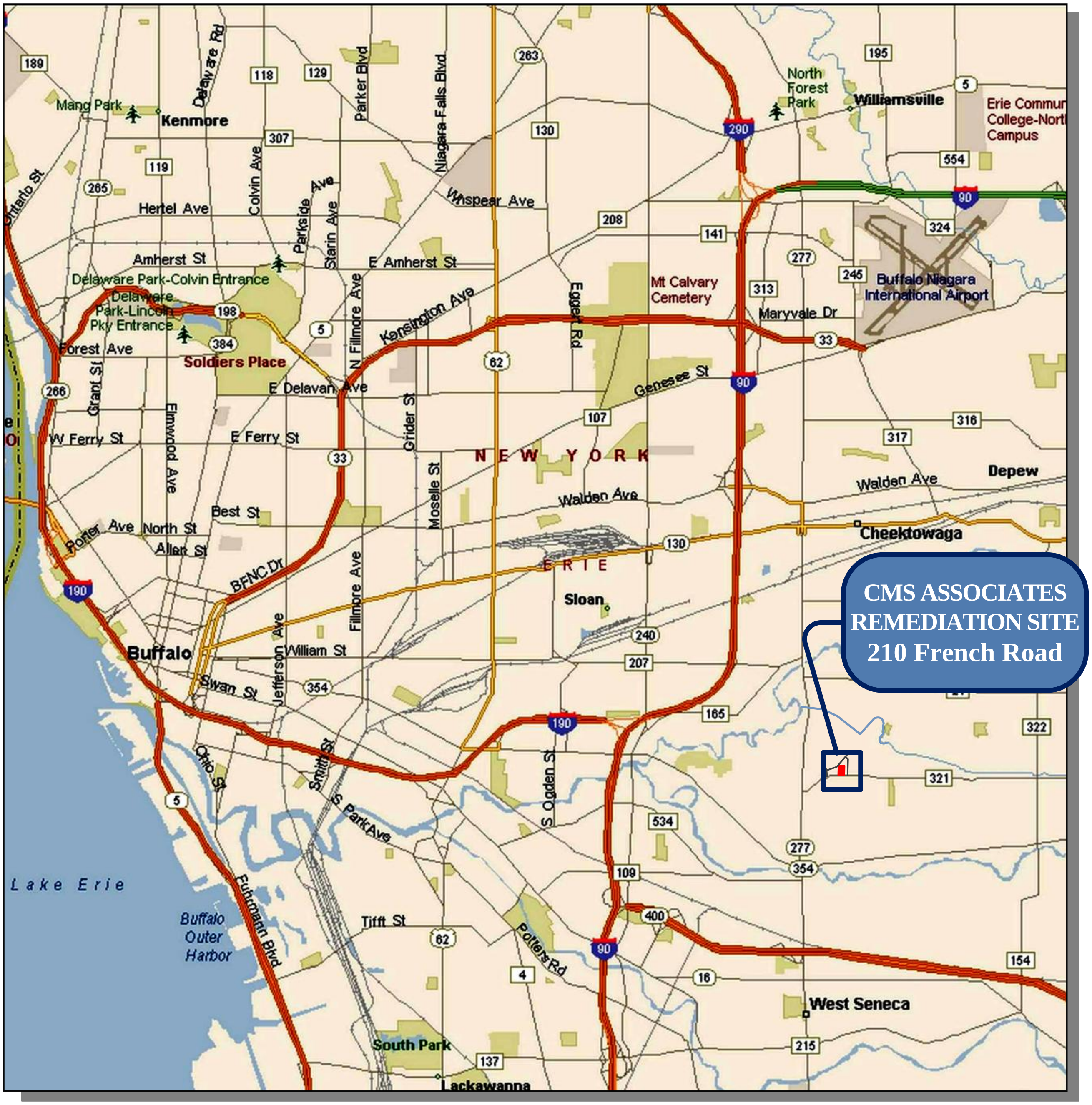
Primary Constituents of Leaking UST

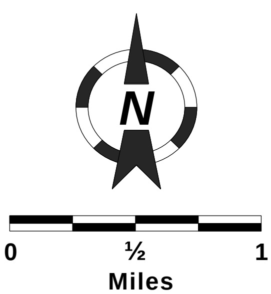
Compound	mg/kg
1,1,1-Trichlorethane (TCE)	200,000
Tetrachloroethene (PCE)	110,000
1,2,4-Trimethylbenzene	10,000
Methylene Chloride	9,900
1,1-Dichloroethane (DCA)	7,900

Note: Detection limits were 5,000 mg/Kg. Additional compounds were most likely present below the lab detection limits.

Subsequent investigations in 1996 showed that an undetermined volume of the LUST contents had contaminated the surrounding soil and entered the underlying limestone bedrock and groundwater regime. More-recent investigations indicate that, in addition to contaminants entering the bedrock proximate to the tank location, the contents likely also moved across the limestone surface. Evidence shows that as the contents likely migrated away from the tank location and encountered additional vertical fractures along its path—which allowed contaminants to enter the underlying bedrock and groundwater.

Initial remediation of the Leaking UST spill included soil bioremediation, installing on-site, perimeter, and off-site monitoring wells, and an Interim Remedial Measure to extract and treat groundwater that began operating in June 1998. In January 2005, the NYSDEC reclassified the CMS Site from Class 2 to Class 4 on the Registry, and Cugini Ventures LLC, purchased the property that November. The adjacent Rosina Food Products, Inc., uses the building to warehouse parts, spare equipment, and packaging/shipping materials.





CMS Associates Remediation Site SVI Evaluation of 210 French Road Building
Figure 1 **SITE LOCATION**
Ken W. Kloeber Consulting Engineers

In 2004, the NYSDEC requested further investigations in the 210 French building (see correspondence, *Appendix A*) to determine if there was soil vapor intrusion into the building envelope. The result of the investigations showed high levels of VOCs under the tested concrete building slab, and corresponding VOCs were detected in the indoor air. Subsequently, in fall 2005, two Sub-Slab Depressurization Systems were installed in the building to mitigate the SVI impact and minimize the opportunity for VOCs to enter the building envelope.

Figure 2 shows the CMS Site and the 210 French Road building under investigation, in relation to the extent of the groundwater contaminant plume as it is currently estimated based on historical groundwater monitoring. This *SVI Evaluation* encompasses only the current warehouse building on the CMS Site—a previous report addresses vapor intrusion into the surrounding buildings.

In spring 2010, CMS filed a *SVI Work Plan* with the NYSDEC and NYSDOH for additional SVI evaluations of the 210 building in order to determine the efficiency of the two SSD Systems and for testing of the building slab in follow-up to the previous 2004 and 2005 work. The results showed that additional indoor-air and sub-slab testing was necessary to determine whether additional SVI remediation is needed to address the VOC levels under the floor slab.

This current *Soil Vapor Intrusion Evaluation* continues the 2010-2011 investigations and addresses both sub-slab and indoor-air VOC levels. The *SVI Work Plan* for this most-recent effort was approved by the NYSDEC in April 2013 and fieldwork started the beginning of May 2013.

1.2 Findings

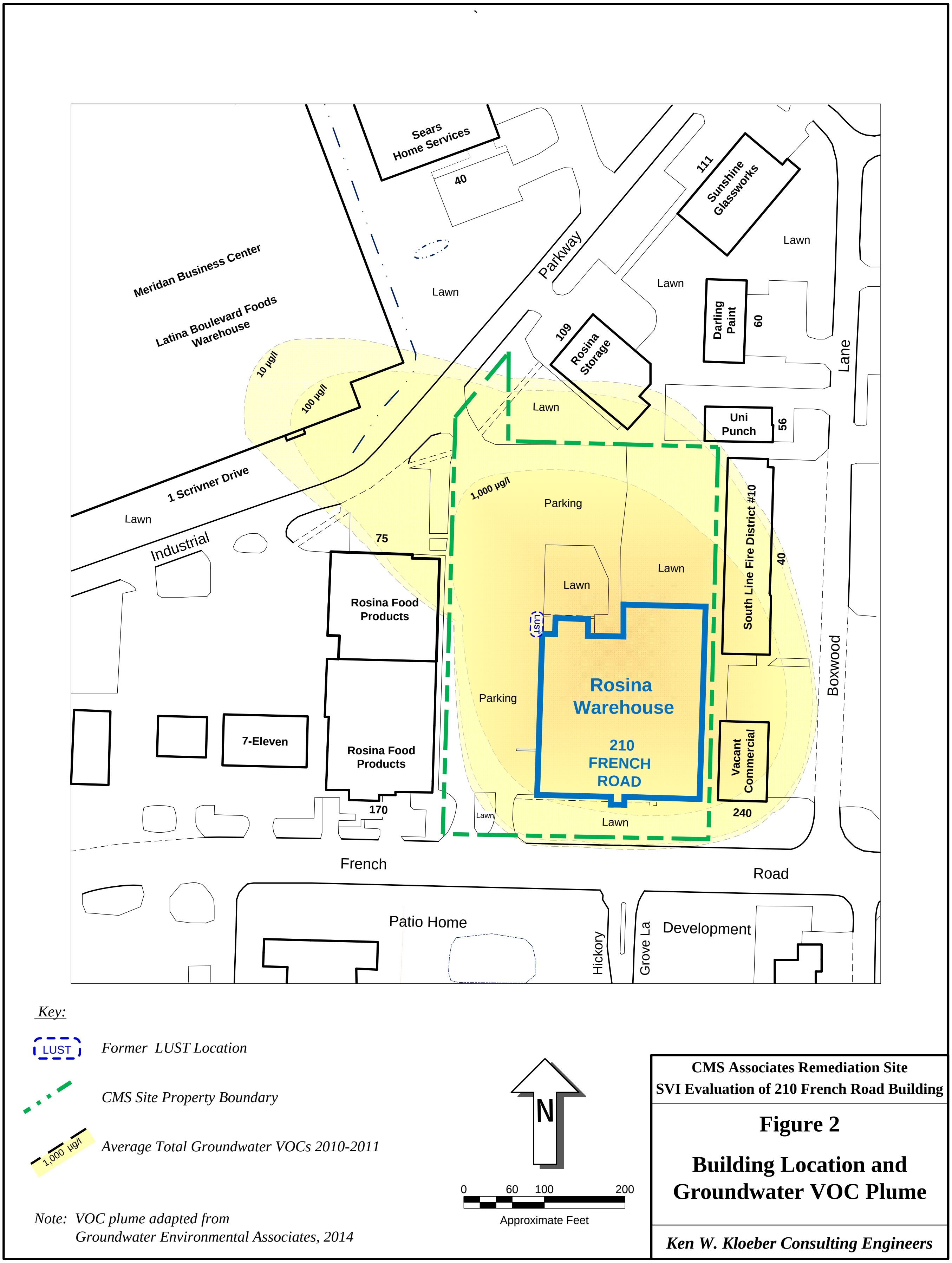
Based on the sub-slab vapor, indoor-air and outdoor-air sampling results, and the evaluations presented in this *Soil Vapor Intrusion Evaluation*, the following is concluded for the 210 French Road building:

1. **When tested during this investigation, the two SVI Sub-Slab Depressurization Systems that were installed in the building in 2005 were highly inefficient in capturing sub-slab VOCs.**

   Although both SSD Systems maintained a sub-slab reduced pressure zone proximate to their locations, sub-slab communication tests in 2010-2011 and in 2013 indicated that the systems were unable to extend the negative-pressure zone across the warehouse footprint. The zone generally extended no more than 20 to 30 feet from each system.

2. **The building floor slab contained significant air leakage such that the Sub-Slab Depressurization Systems were unable to maintain a wide reduced-pressure zone.**

   We discovered that the concrete floor slab had minor to severe air leaks near each SSD System, as well as further away—where the sub-low-pressure zones dropped off dramatically. Leakage was located along the perimeter block walls, in the repaired concrete floor atop the trenches where the SSDS suction lines were installed, around steel column bases, at pipe penetrations, and in cracks and joints in the concrete slab.



Sears
Home Services
40
Meridan Business Center
Latina Boulevard Foods
Warehouse
Lawn
Parkway
111
Sunshine
Glassworks
Lawn
Lawn
Darling
Paint
60
109
Rosina
Storage
10 µg/l
100 µg/l
Lawn
Uni
Punch
56
1 Scrivner Drive
1,000 µg/l
Parking
Lawn
Industrial
75
South Line Fire District #10
40
Lawn
Lawn
Rosina Food
Products
LUST
Rosina
Warehouse
210
FRENCH
ROAD
Parking
7-Eleven
Rosina Food
Products
Boxwood
Vacant
Commercial
170
Lawn
Lawn
240
French
Road
Patio Home
Hickory
Grove La
Development
Lane
Key:
LUST
Former LUST Location
CMS Site Property Boundary
1,000 µg/l
Average Total Groundwater VOCs 2010-2011
N
0 60 100 200
Approximate Feet
Note: VOC plume adapted from
Groundwater Environmental Associates, 2014
CMS Associates Remediation Site
SVI Evaluation of 210 French Road Building
Figure 2
Building Location and
Groundwater VOC Plume
Ken W. Kloeber Consulting Engineers

3. **To be able to complete the SVI Evaluation properly, it was necessary to first remediate the floor slab and eliminate air leakage nearby the SSD Systems and in other locations across the building footprint.**

   It was necessary to coordinate with Rosina Food Products, the building operator—for it to relocate large pieces of equipment, a vehicle, and racks of spare parts stored in the warehouse—in order to carefully locate and verify leak locations, and then expose and clean them of debris and dust. Three days of sealing were undertaken in 2013—and all discovered leaks were sealed tight using urethane sealant and, where appropriate, closed-cell backer rod and sealant.

4. **Remediating the leaks in the floor slab was highly successful and dramatically increased the effectiveness of the SSD Systems and the reach of the reduced-pressure zone across the building footprint.**

   The building was tested after sealing the air leaks, first allowing the soil pores to dry out, and the sub-slab conditions to equilibrate. That was necessary in order to extend the below-slab "spider-like" pathways that transmit vacuum within the sub-slab media. The testing showed that negative pressures were observed over 80% of the central warehouse, with only the extreme northeast and southwest corners remaining uncovered.

5. **The 210 French Road building foundation prevents the extension of the reduced-pressure zone created by the SSD Systems to beyond its current extent.**

   A wall footer (that may extend to bedrock) surrounds the central warehouse perimeter. In effect, the footer interrupts the continuity of the sub-slab and traps the reduced-pressure zone within its footprint.

   Two building additions to the block structure—a room on the northeast corner (used for equipment maintenance, repair, and fabrication,) and the "Carbtrol room" on the northwest corner (that houses the groundwater extraction and treatment equipment,) are effectively isolated from the reduced pressure zone from the current SSD Systems. To the south, the footer also isolates a former office area that is currently used for storage.

6. **Indoor air tests show that the seven regulated VOC compounds generally fall into the lowest and second-lowest categories of the NYSDOH *Soil Vapor/Indoor Air Matrix 1* and *Matrix 2*.**

   An exception is the "Carbtrol room," where higher VOCs might be expected because it is next to the former LUST location and there is no reduced-pressure zone under its floor slab. Even though stripped VOCs are exhausted outside the building, the groundwater treatment system in the room may also be contributing to higher VOCs in that very limited area.

7. **Sub-slab VOC levels resulting from the LUST spill remain high beneath the floor slab, and warrant continued operation of the SSD Systems and extending their reduced-pressure zones across the building footprint.**

   When compared against regulated VOCs that are present in the building, the NYSDOH SVI decision Matrix 1 and Matrix 2 recommends remediation to prevent potential VOC intrusion into the building envelope and resulting indoor-air impacts. The remediation of leaks in the floor slab and increasing the efficiency of the SSD Systems will be significant in controlling soil vapor intrusion.

8. **The configuration of the current Sub-Slab Depressurization Systems needs to be improved in order to adequately capture and safely exhaust sub-slab vapors outside the building envelope.**

   The suction fans for the two systems are mounted on the floor slab inside the structure, and the two 4-inch PVC, higher-pressure discharge lines are hung on the adjacent walls and run from the fans to the roof. This configuration would allow a leak on the high-pressure (discharge) side to pump VOCs extracted from the sub-slab, into the building envelope.

   When inspected, the pipe joints appeared to be sealed and no leakage was observed. There were however, minor leaks at the discharge point on the fan—which we sealed to prevent those from introducing VOCs into the building during the short term.

   The two suction fans must be relocated to the roof, with all high-pressure piping relocated to outside the building envelope. The system components also need to be clearly labeled, and monometers installed on the suction headers so system performance can be easily verified.

9. **The current SSD Systems need to be augmented in order to control sub-slab VOCs under portions of the building that lie north and south of the central warehouse footer.**

   The reduced pressure zone from the two SSD Systems can be extended using the existing and two additional fans, and piping the suction lines into those two outlying areas of the building. Sub-slab vacuum “pods” can be constructed around selected building columns, with the suction lines led through the roof steel joist work, to the relocated fans.

10. **Once the two Sub-Slab Depressurization Systems are brought up to current standard, they should be placed on an at-least-annual inspection.**

    The improved SSD Systems must be inspected at least annually to verify proper fan operation and efficiency, that piping and joints are intact with no leaks, that negative pressure is maintained in the suction headers, and to ensure overall system performance. With manometers installed at key locations, a problem with the suction fans, a leak in the suction headers, or the overall operation of the system can be immediately observed by the building owner or operator and reported to CMS for correction.

1.3 Recommendations

Based on the findings above, the following SVI remediation is recommended:

1. **Relocate the blowers and high-pressure piping of the current Sub-Slab Depressurization Systems to the roof, so they are out of the building envelope.**

2. **Extend the reduced pressure zone to the remainder of central warehouse area.**

    - Install new sub-slab suction cavities to cover the northeast and southwest areas of the central warehouse footprint

    - Tie these into the two current SSD Systems.

3. **Extend the reduced pressure zone to the north and south areas of the building.**

    - Install suction cavities and related suction manifolds, and two new blowers on the roof to cover those areas that lie north and south of the central warehouse footer.

    - Inspect the floor slab in those areas and seal air leaks as necessary.

4. **Install manometers on the remediation system at key locations, and place the system on an annual inspection.**

II **POTENTIAL for SVI IMPACT in 210 FRENCH ROAD BUILDING**

2.1 Prior Sub-Slab Vapor Evaluations

The 210 French Road property was formerly owned by CMS Property Associates, LLC, and was the subject of prior sub-slab VOC investigations in 2004 and 2005. In 2004, CMS desired to sell the property and requested that the NYSDEC revise it from Class 2 to Class 4 on the NYS Registry of Inactive Hazardous Waste Sites. During this period, the NYSDEC requested that CMS undertake an *Air Intrusion Study* to determine if volatile organic compounds from the groundwater plume and contaminated bedrock had entered the building envelope (see correspondence, *Appendix A*.)

2.1.1 2004 Investigation

In 2004, New York State's program to evaluate potential impact from soil vapor intrusion at inactive hazardous waste sites was in its infancy, and the NYSDOH had not yet issued its *Guidance For Evaluating Soil Vapor Intrusion in the State of New York* (October 2006.) Therefore, the 2004 investigation was accomplished using the then-available best information, and procedures that we agreed upon with the NYSDOH based on Radon-related studies and residential building remediation.

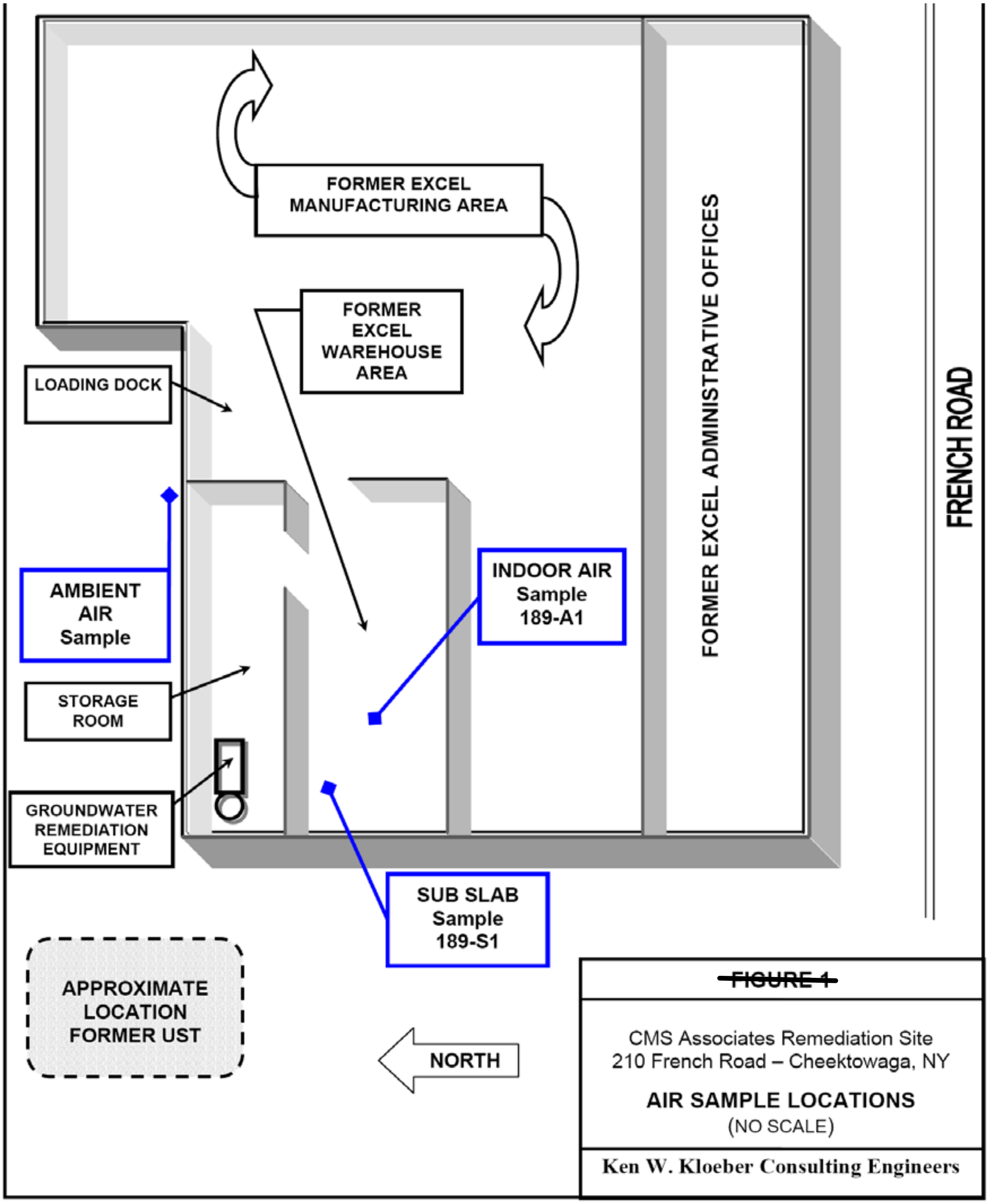
Indoor air and sub-slab samples in 2004 led to the NYSDEC and NYSDOH requiring that CMS mitigate high sub-slab VOC concentrations (see *Figure 3* for the sub-slab vapor, indoor air, and ambient outdoor air sample locations.)

Sub-slab vapor sample 189-S1 contained the following VOCs that were also observed in groundwater monitoring well samples:

Table 2

2004 SUB-SLAB VAPOR VOCs

Compound	µg/m3
1,1,1-Trichlorethane (TCA)	3,500
Toluene	170
Chloroform	98
1,1-Dichloroethane (DCA)	27
m-Xylene	23
Ethylbenzene	8.8
p-Xylene	8.5
Benzene	5.0
Tetrachloroethene (PCE)	1.9



CMS Associates Remediation Site
SVI Evaluation of 210 French Road Building

Figure 3

2004 AIR SAMPLE LOCATIONS

Ken W. Kloeber Consulting Engineers

Note: Graphic adapted from October 2004 Air Intrusion Study

The following seven compounds present in the indoor air sample 189-A1 were also observed in the groundwater monitoring wells:

Table 3

2004 INDOOR AIR VOCs

Compound	µg/m3
Toluene	7.7
m-Xylene	6.8
1,1,1-Trichlorethane (TCA)	4.4
p-Xylene	3.0
Ethylbenzene	2.6
Trichlorofluoromethane	1.7
Benzene	1.3

The high concentration of *1,1,1-TCA* in the sub-slab vapor sample indicated that the contaminant plume had migrated under the building and was contaminating the soil vapor under the concrete slab. Likewise, the *1,1,1-TCA* in the indoor air sample indicated that soil vapor may have subsequently intruded into the building envelope. Because of the high level of *1,1,1-TCA* in sample 189-S1, in December 2004, the NYSDEC required that CMS undertake further investigation to evaluate the soil vapor intrusion potential into the building.

2.1.2 2005 Investigation

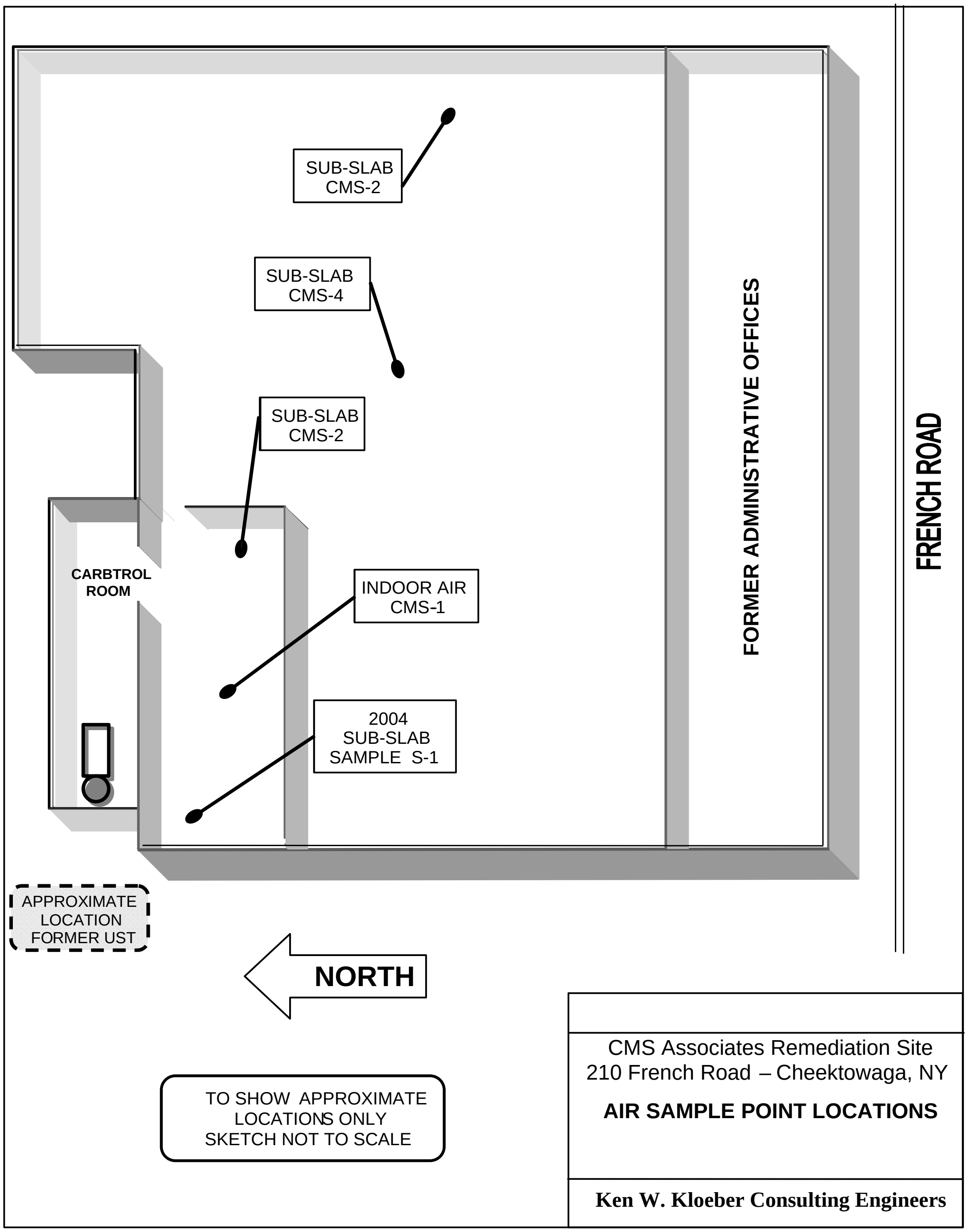
In May 2005, a *Soil Vapor Intrusion Work Plan* was prepared to continue investigating VOC intrusion into the building envelope, and was subsequently approved by the NYSDEC and NYSDOH. CMS also agreed to install a SVI remediation system if the additional testing revealed high indoor or sub-slab VOC concentrations (see correspondence in *Appendix A*.)

Initial screening using an HNu OVA identified locations under the floor slab that had potentially high VOC levels. Subsequent indoor and sub-slab air sampling in May 2005, revealed high concentrations of the following compounds in various spots beneath the slab (see *Figure 4*):

Table 4

2005 SUB-SLAB VAPOR VOCs

Compound	Range, µg/m3
1,1,1-Trichloroethane (TCA)	0 – 2,600
1,1-Dichloroethane (DCA)	180 – 22,000
1,1-Dichloroethene (DCE)	160 – 9,100
Trichloroethene (PCE)	0 – 900



Note: Graphic adapted from May 2005 Air Sampling Plan

CMS Associates Remediation Site
SVI Evaluation of 210 French Road Building

Figure 4

2005 AIR SAMPLE LOCATIONS

Ken W. Kloeber Consulting Engineers

The highest sub-slab VOCs were observed at sample locations 189-S1, CMS-3, and CMS-2 (see *Figure 4*.) Sample CMS-4 exhibited lower VOCs, yet it was virtually mid-point between two of the highest readings. That indicated a potential discontinuity of the sub-slab media, or something present to block the free movement of the vapor.

VOCs present under the slab indicate that the groundwater contaminant plume extended beneath the building footprint. According to CMS, a 5-inch unreinforced-concrete slab was poured atop 4-inches of crushed stone so—barring a significant anomaly in the composition or compaction of the underlying base material—there was an opportunity for good vapor communication below the slab. The lower VOCs in sample CMS-4 may indicate such an inconsistency.

No sub-slab or indoor-air testing was preformed in the former office area at the south end of the building (see *Figure 4*) because (1) it was unsure if Cugini Ventures would conclude the purchase; (2) those areas were not to be occupied; (3) use of the space was uncertain; and (4) the structure might be reconstructed or even demolished in the future.

In fall 2005, the CMS installed two Sub-Slab Depressurization Systems in the building and sold the property to Cugini Ventures in late 2005. Cugini currently leases the building to the adjacent Rosina Food Products, Inc., at 170 French Road—who warehouses spare machinery and mechanical parts, and stores equipment, maintenance/cleaning, packaging/shipping, and other non-food supplies.

2.2 Groundwater VOCs

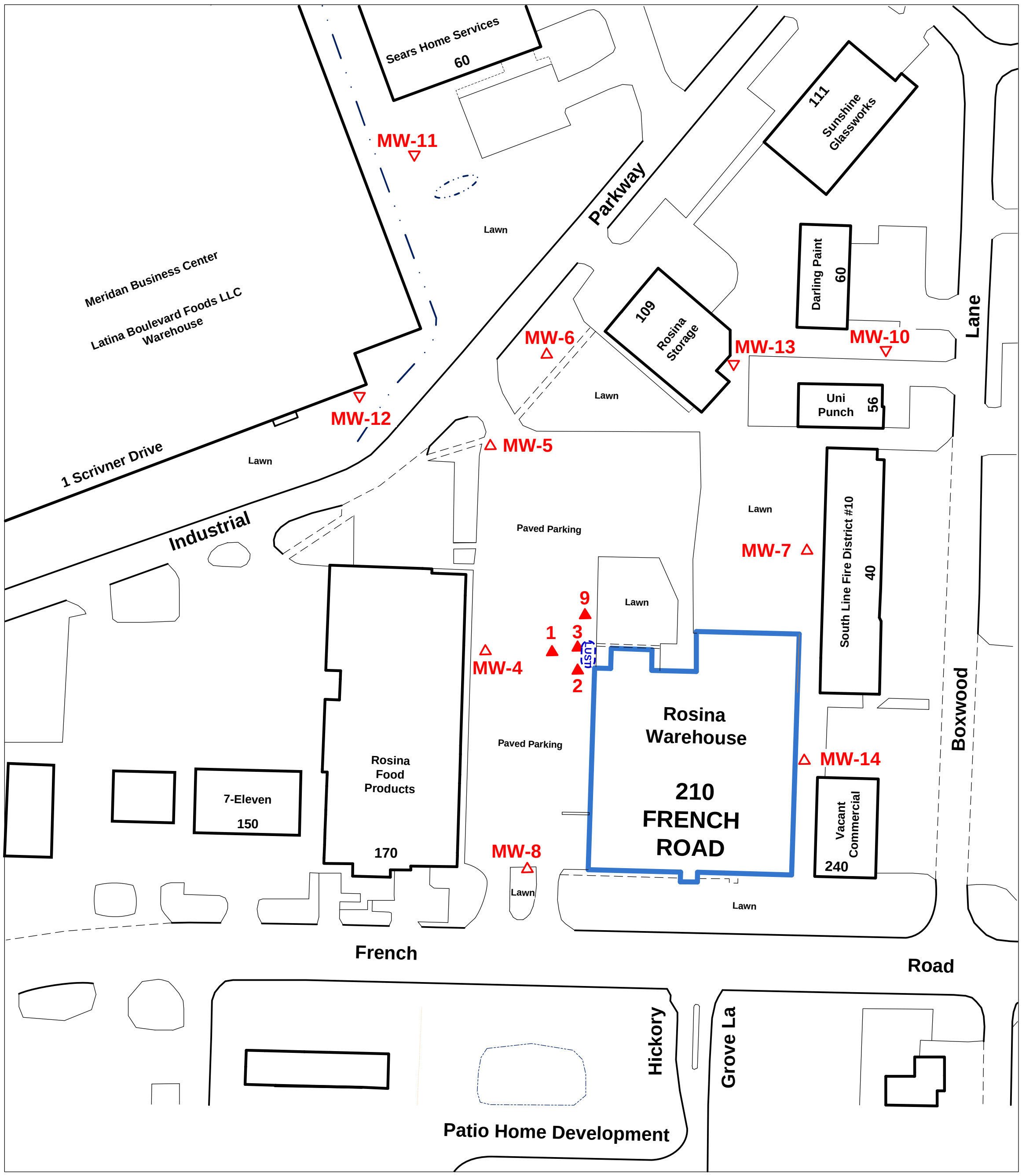
Evidence indicates that the contents of the LUST had moved across the top of bedrock and away from the proximity of the tank itself. The top-of-bedrock elevations support the conclusion that VOCs moved to underneath the 210 French Road building slab before encountering vertical cracks in the bedrock that introduced the contaminants into the underlying bedrock/groundwater regime.

Perimeter monitoring well MW-14 was installed in 2011 near the north-south mid-point of the east side of the 210 French building—and lies approximately 7-feet outside the east wall (see *Figure 5*). It has exhibited high total VOCs (~3,600 – ~8,300 µg/l), including *1,1,1 Trichloroethane* (540 – 4,190 µg/l,) *1,1 Dichloroethane* (1,970 – 3,400 µg/l,) and *cis-1,2-Dichloroethene* (114 – 206 µg/l.)

The former LUST was directly west of the northeast corner of the 210 French Road building, and groundwater wells MW-1, -2, and -3 are nearest the floor slab. After the groundwater extraction IRM was instituted, they exhibited total VOCs in the range of ~2,700 to ~13,000 µg/l at MW-1, ~2,100 to 33,000 µg/l at MW-2, and ~1,300 to ~29,500 µg/l at MW-3.

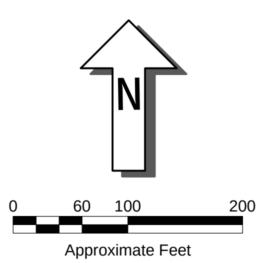
The SVI-regulated VOC compounds have additionally been present in those wells, including *Trichloroethene* (~50 – ~12,000), *Vinyl Chloride* (~20 – ~1,200 µg/l), *1,1-Dichloroethene* (~100 – ~1,600 µg/l), *1,1,1-Trichloroethane* (~140 – ~1,600 µg/l), *cis-1,2-Dichloroethene* (~30 – 15,000 µg/l), and *Tetrachloroethene* (~60 – ~3,300).

The new perimeter well MW-14 also helped further define the groundwater VOC plume and yielded data to evaluate the potential for SVI impact on the 210 building (see Figure 2 for the estimated extent of the VOC plume.)



Key

- LUST — *Former LUST Location*
- △ *Perimeter Monitoring Wells (6)*
- ▽ *Off-site Monitoring Wells (4)*
- ▲ *Extraction/Monitoring Wells (4)*



CMS Associates Remediation Site
SVI Evaluation of 210 French Road Building

Figure 5

Groundwater Monitoring Well Locations

Ken W. Kloeber Consulting Engineers

Based on the historical groundwater quality observed in the extraction wells near the northwest corner of the building and the newest well MW-14, the anticipated potential is high for SVI impact at 210 French Road.

2.3 2010-2011 SVI Investigations

In 2009, KWKCE evaluated the potential for soil vapor intrusion at the 11 buildings in Table 5, and in 2010-2011 sampled sub-slab vapor at the seven locations that warranted further evaluation. Findings for the buildings surrounding the CMS site are addressed in the separate October 2013 *Soil Vapor Intrusion Evaluation of Surrounding Properties for CMS Associates Remediation Site* that was submitted to the NYSDEC and NYSDOH.

The 210 French Road building was evaluated using a step-wise methodology contained in the approved *SVIE Work Plan*. The first step being to sample sub-slab vapor to confirm whether NYSDOH-regulated compounds existed underneath the building—initially excluding testing indoor air and inventorying the building contents.

The initial building evaluations and sub-slab sampling was completed over the 2010-2011 heating season, and the results revealed that it was necessary to obtain indoor-air samples to utilize the NYSDOH *Soil Vapor/Indoor Air* [decision] *Matrix* to evaluate whether additional remediation was necessary in the building.

The 2010-2011 SVI work formed the basis of the *SVI Work Plan* that led to the investigations and findings that are presented herein. The NYSDEC did not allow the prior sub-slab vapor test results to be utilized, and required new vapor testing. We did, however, consider the prior test results in deciding where to locate indoor-air and additional sub-slab test locations during the 2013 SVI investigations in the 210 French Road building.

Table 5

SVI Potential - Properties Surrounding CMS Remediation Site

Address	Property Use	Anticipated Potential for SVI Impact	SVIE Methodology
210 French Road	Rosina Food Products Warehouse	High	Sub-slab PID screening & vapor sampling Nov 2010 Indoor air & sub-slab sampling May 2013.
170 French Road	Rosina Food Products South half of building	None	No further action necessary.
40 Industrial Pkwy	Sears Home Services		
111 Industrial Pkwy	Sunshine Glassworks		
60 Boxwood Lane	Darling Paint		
1 Scrivner Drive	Meridan Business Center Latina Boulevard Foods Warehouse	Low	Sub-slab PID screening & vapor sampled Nov 2010. Indoor air & sub-slab sampled June 2013.
109 Industrial Pkwy	Rosina Food Products storage		Sub-slab PID screening & vapor sampled Nov 2010. *Owner declined further sampling November 2012*.
75 Industrial Parkway	Rosina Food Products North half of building	Moderate	Sub-slab PID screening & vapor sampling proposed in 2009. *Owner declined offer to sample building in 2010.*
56 Boxwood Lane	Uni-Punch		Sub-slab PID screening & vapor sampling Nov 2010 Indoor air & sub-slab sampling May 2013.
40 Boxwood Lane	South Line Fire District #10		Confirmed details of vapor barrier installed during 2006 reconstruction. Sub-slab PID screening & vapor sampled Feb 2011. Indoor air and sub-slab vapor sampled June 2013.
240 French Road	Vacant Commercial		Sub-slab PID screening & vapor sampled 2010. Indoor air and sub-slab vapor sampled June 2013.

III SVI INVESTIGATIONS

3.1 Investigation Methodology

The SVI evaluation consisted of first identifying the potential for vapor intrusion into the 210 French Road building based on currently available information (historical groundwater sampling, and groundwater movement, published bedrock lithology and overburden soil, and the *Conceptual Site Model* previously developed for the CMS Site.) The assessment indicated that the highest sub-slab VOC concentrations would likely be in the north and northwest, and southeast areas of the building footprint.

Sub-slab sampling completed over the 2010-2011 heating season showed that indoor-air testing was necessary to utilize the NYSDOH decision matrix to determine if there was SVI impact. The 2013 *SVIE Work Plan* therefore included indoor-air sampling, coupled with sub-slab vapor testing. The initial fieldwork involved shutting down the two SSD Systems at least 72 hours beforehand, and sampling ambient air at one location and indoor air at 13 locations that reflected differing interior conditions—such as closed-up rooms, areas with potentially high sub-slab VOCs, and in the open warehouse and spare parts cage. The last location being the only one that is regularly occupied by Rosina Food Products employees.

In a large building situation, we would typically sample indoor air after screening the sub-slab vapor and confirming areas that have potential high VOCs and thus greater opportunity for vapor intrusion impact. However, the *SVIE Work Plan* was approved on April 26, 2013, and we prepared to sample indoor air as soon as practical thereafter—on weekend of May 4-5—because spring conditions meant that the three overhead doors may be left open during the warming temperatures, and would affect our sampling results. In addition, our access to and operations in the warehouse, were restricted to maintaining a "low profile" with one or two people undertaking sampling and other operations—typically during non-operating periods. Since sub-slab screening and VOC sampling, and other work would need to be distributed over the upcoming weekend days and nights—the indoor air sampling was most critical to complete as quickly as possible.

We had sub-slab screening and vapor-sampling results to use as a guide to consider where to place indoor-air sampling locations, and we arranged for the building to be closed up for 48 hours before indoor air sampling—with only man-doors being opened for access.

The next procedure after indoor-air sampling was to screen the sub-slab to determine areas with the highest concentrations, by drilling the concrete floor, and testing for total VOCs using a ppb-RAE PID. This step also identified locations that were inappropriate for further testing—such as where the sub-slab media was too "tight" to allow vapor transmission, or where the differential pressure did not lend itself to low-flow sampling. Unless specifically identified herein, the SSD Systems remained off during the SVI investigation.

Sub-slab vapor was sampled at 29 locations in the building—more than double the 10-15 that were anticipated in the *SVI Work Plan*. Additional locations were chosen based on the sub-slab screening results, and after evaluating the building foundation footer and the 2010-2011 sub-slab VOC vapor sampling results.

3.2 Sampling Protocol

3.2.1 Sample Canisters and Flow Regulators

We collected all vapor and air samples using 3-liter, stainless steel, Summa-type canisters provided by Con-Test Analytical Laboratory—each paired with a lab-calibrated, one-hour-duration airflow regulator, and a 1/4" barbed hose adaptor for the sampling tubing.

A one-hour sampling period was chosen in consultation with the NYSDOH (see *Appendix A*.). This duration equates to a flow rate of 0.05 Liter/min—or 25% of the maximum (0.2 liter/min) recommended in NYSDOH guidance for sub-slab vapor sampling. Using 25% of the recommended rate reduces the potential for stripping VOCs from the sub-slab media, and prevents short-circuiting and leakage of indoor air into the vapor sample.

Con-Test *batch-certified* the vapor canisters to be clean, and *individually certified* each indoor-air and outdoor-air canister. It also leak-tested each regulator/canister pair before shipping.

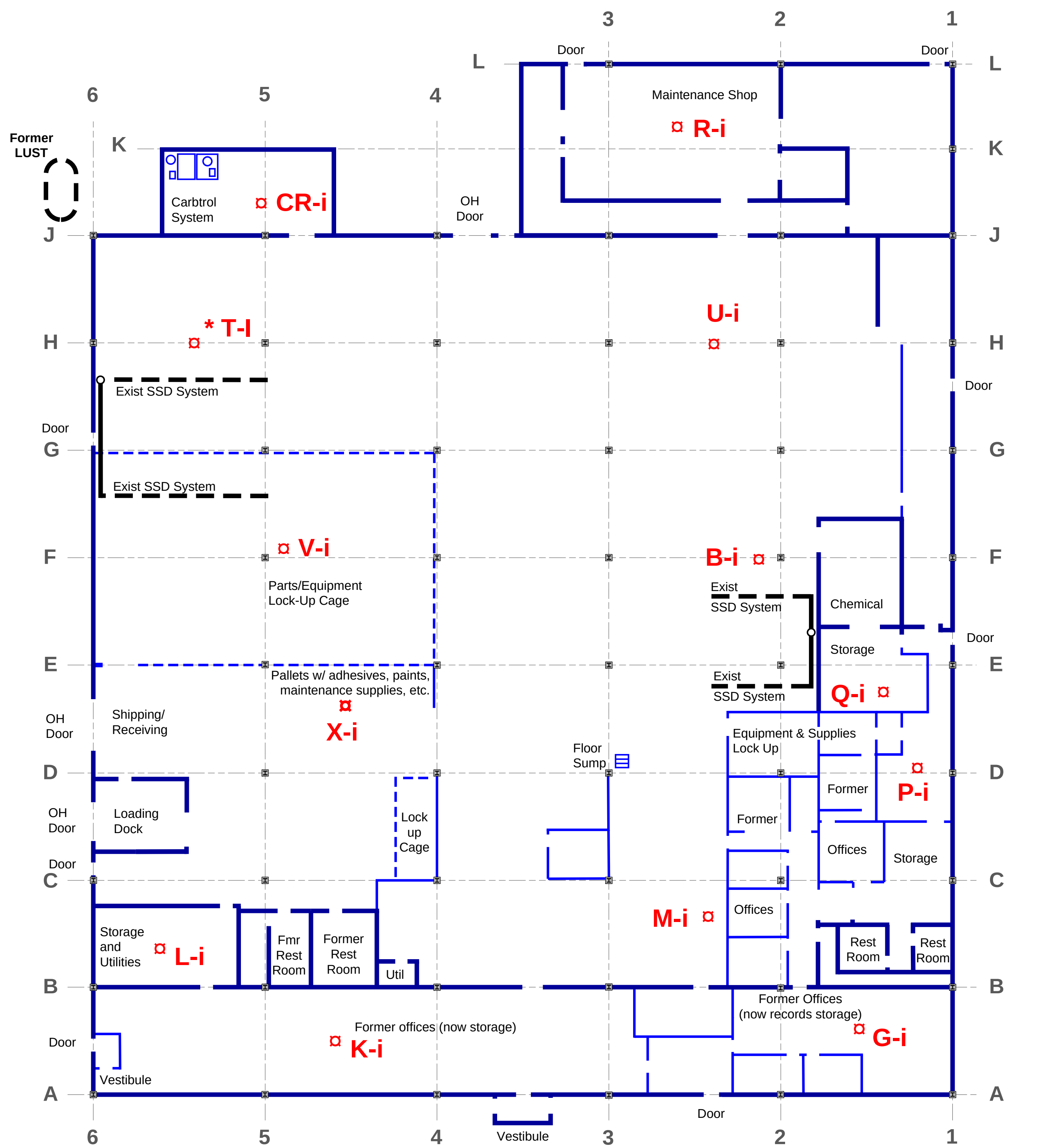
We additionally tested each regulator/canister pair on site for leakage before deploying each sampling setup. We installed the regulator and sealed its inlet with an airtight rubber cap and charged the regulator assembly with vacuum from the canister, and then closed the valve and recorded the vacuum reading. The canister and regulator sat for at least 24-hours—after which we checked the gauge to confirm there was no leakage. Any canisters/regulators not passing the test were returned unused to Con-Test. Although leakage is not a significant issue for those setups designated for indoor or outdoor air, we also tested those setups in case we needed to use one of them for sub-slab sampling.

3.2.2 Indoor Air Sampling

We collected indoor-air samples and one field duplicate at 13 locations in the building (see *Figure 6*.) The 3-liter Summa canister was housed inside a 5-gallon plastic bucket with a five-foot-length of 1/2-inch PVC pipe affixed to its side. Its sampling tubing was run to the top of and zip-tied to the PC pipe so that the sample would be drawn from within the adult breathing zone.

To commence sampling, the valve on the Summa canister was opened, and the beginning time and vacuum recorded. After one hour, the ending vacuum was recorded, the valve closed, the chain-of-custody completed, and the canister tagged with appropriate information. The regulator was then removed from the canister and the equipment packaged for return to Con-Test via FedEx.

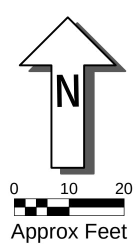
To complete the required number of locations, we arranged to sample the first weekend in May 2013, and concurrently sampled the points beginning 0530 on May 6, 2013—starting each at approximate 10-minute intervals—with the last sample completed at 1033 the same morning.



Key:

A-i ¤ Indoor Air Sample Location

***T-i** ¤ Field Duplicate Sample



CMS Associates Remediation Site
SVI Evaluation of 210 French Road Building

Figure 6

Indoor Air Test Locations

Ken W. Kloeber Consulting Engineers

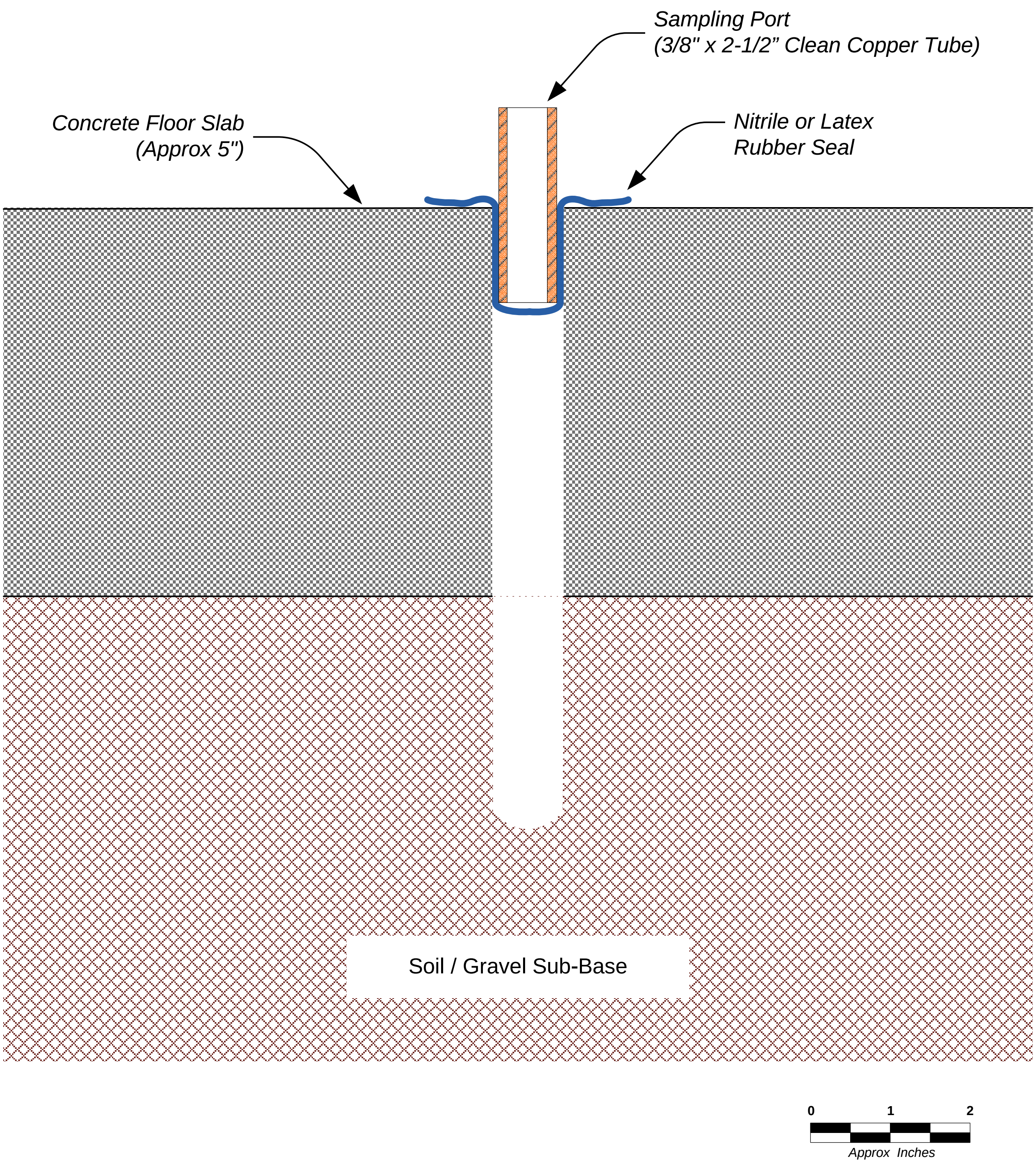
3.2.3 Outdoor Ambient Air Sampling

While sampling the indoor air, we collected a 1–hour, outdoor-ambient air sample using the identical assembly and procedures as for the indoor-air samples. We chose an upwind location in the adjacent 210 French Road building parking lot, with the assembly sitting atop monitoring well MW-8 (see *Figure 5*.) After sampling, the regulator was immediately removed from the canister and the units packaged for return to Con-Test via FedEx.

3.2.4 Sub-Slab Probe Installation

To facilitate ease of sampling sub-slab vapor, all ports were preinstalled in the concrete floor using the following procedure:

1. Cleaned off the slab sample location using a whiskbroom and dampened, clean paper towel.
2. Dry-drilled the slab with a 1/2-inch rotary-hammer using a carbide-tipped, 3/8-inch, SDS-drive bit. The majority of locations were bare or painted concrete, with no issues regarding floor coverings such as carpeting. Much of the floor is covered by could be asbestos floor tile—which we attempted to avoid by using locations with missing tile.
3. Probed with a 1/8-inch, threaded steel rod, with a lock nut on the bottom to measure slab thickness, to determine sub-base material (e.g., soil, gravel, stone, etc.,) and to ensure a clear sampling pathway existed.
4. Installed a temporary 3/8-inch sampling port with a mechanical seal (see *Figure 7*.)
5. Installed 0.170-inch-ID / 0.25-inch-OD, PTFE-lined-polyethylene sampling tubing with a 1/4-inch x 3/8-inch silicone-tubing seal between it and the sampling port (see *Figure 8*.)
6. Cleaned the area using a small whiskbroom and wetted clean paper towel. No vacuum or compressed air was used to clean the slab around the sample port. Where it was necessary to drill through floor tile, the sample hole was drilled slowly, and we carefully dampened and removed the *de minimis* remains of drilling.



Notes: *For clarity the diameter of the sampling port is exaggerated 2X compared to the thickness of the floor slab.*

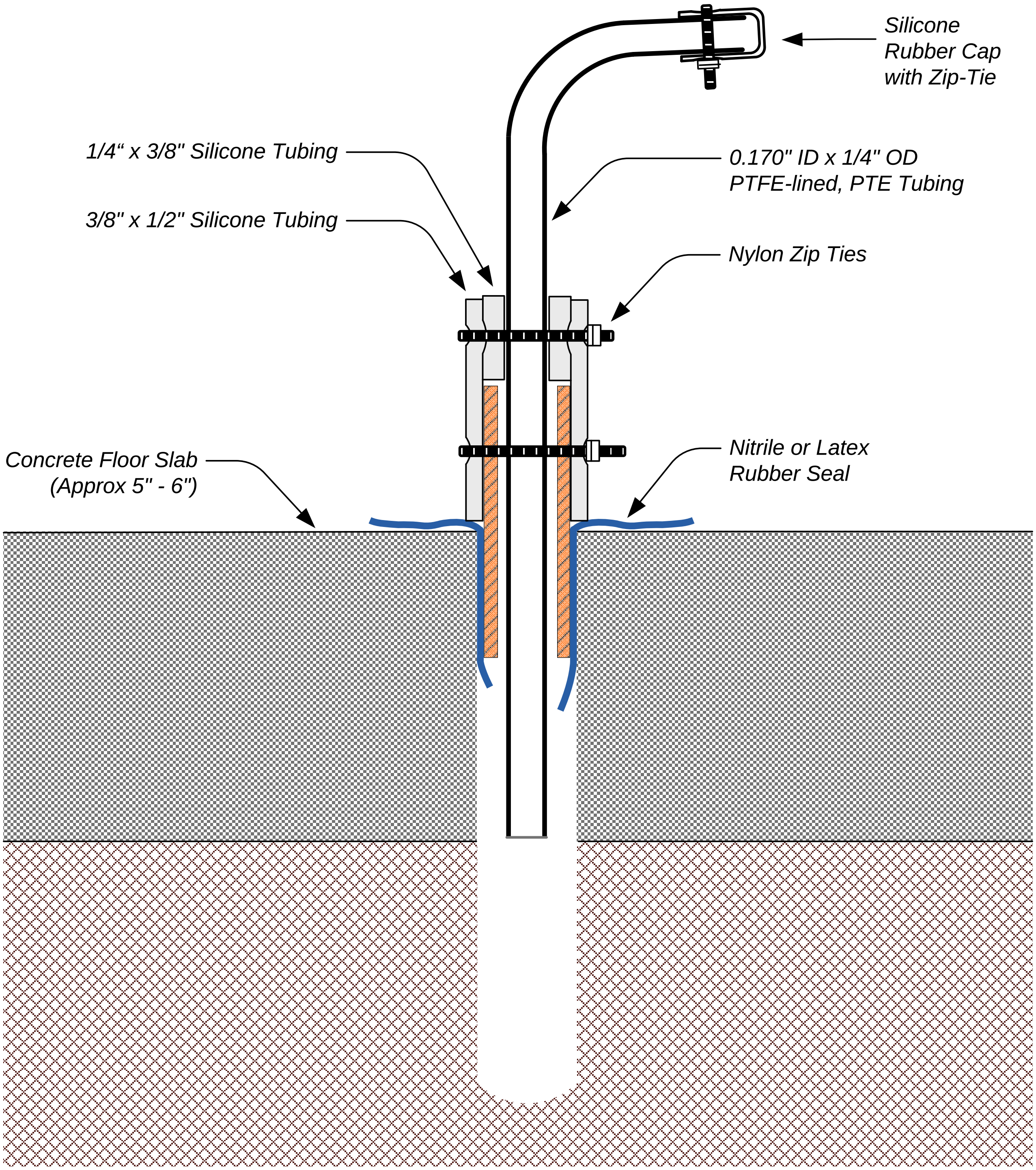
3/8" hole extends 3-4 inches below the slab to extract soil using the drill flutes to characterize the sub-base, and to provide clearance to minimize the risk of picking up particles during sampling.

CMS Associates Remediation Site
SVI Evaluation of 210 French Road Building

Figure 7

Sub-Slab Sample Port Installation

Ken W. Kloeber Consulting Engineers



CMS Associates Remediation Site
SVI Evaluation of 210 French Road Building

Figure 8

Sub-Slab Vapor Sampling Assembly

Ken W. Kloeber Consulting Engineers

Notes: ***For clarity the scale of the sample port assembly and tubing is exaggerated compared to the thickness of the floor slab.***

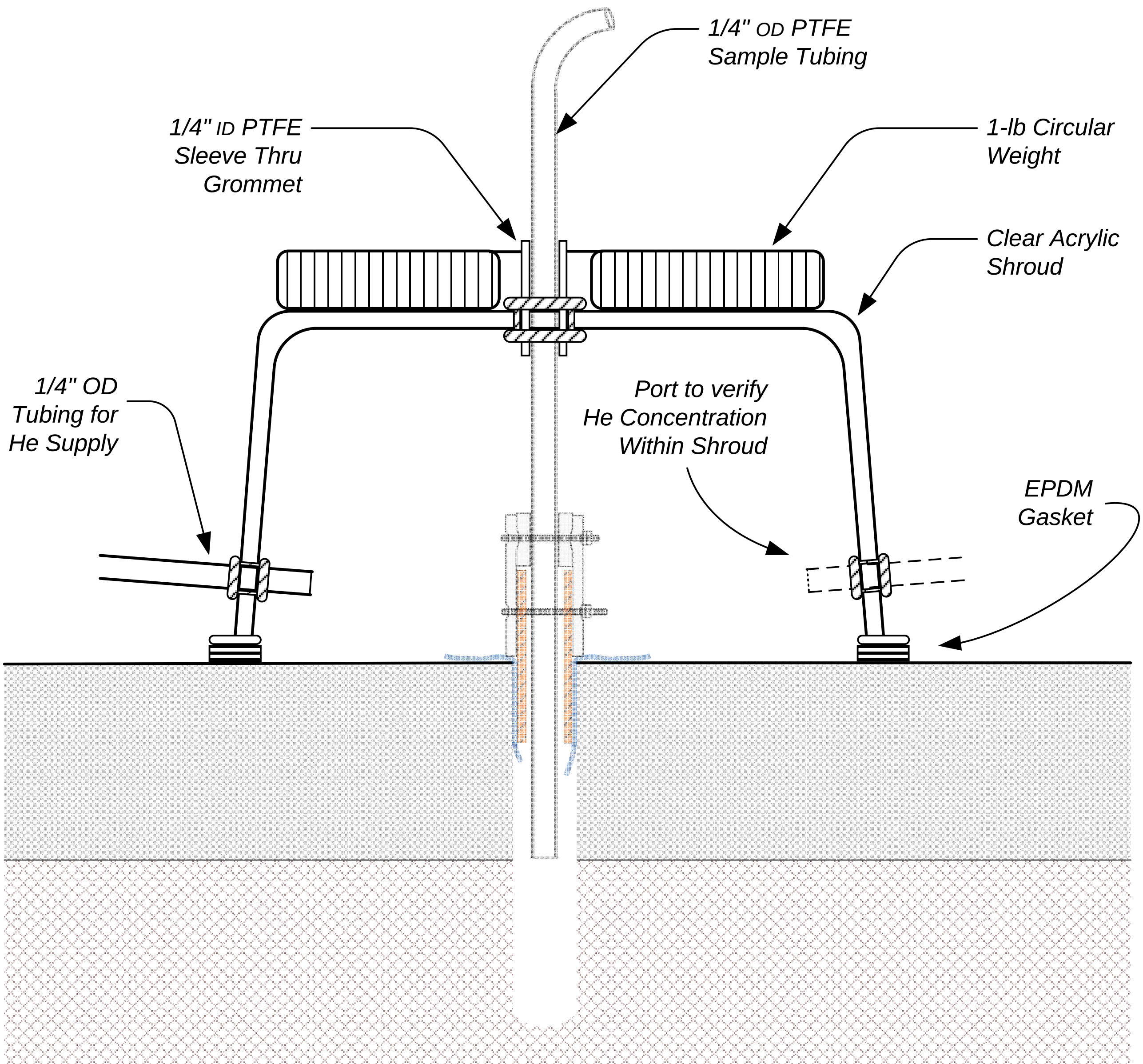
3.2.5 Sub-Slab Screening

To screen potential vapor test locations, the installed sampling port was checked for differential sub-slab pressure, total VOCs were measured with a ppb-RAE PID, and the seal tested for leakage. If the spot was appropriate for collecting a sub-slab vapor sample, the test port was left in place and the location secured against damage.

1. To test for sub-slab differential pressure conditions, an OmniGuard IV electronic manometer was connected to the sampling tubing and conditions allowed to equilibrate until consistent readings were observed, and then the meter was removed.
2. A RAE Systems ppb-RAE PID was then immediately connected to the sampling tubing, and the sub-slab screened for total VOCs. The PID was operated on slow pump speed and the peak VOC level was recorded.
3. The sampling port and mechanical seal was then Helium leak-tested using a shroud assembly (see *Figure 9)* and this procedure:
   a. The shroud was carefully slid over the sample tubing to keep the seal intact.
   b. A canister of > 99% grade He gas was connected to a side port on the shroud using 1/4-inch-OD vinyl tubing. We used a flow (rather than pressure) regulator on the assembly, a needle valve on the outlet of the regulator (to fine-tune the flow rate,) and a 1/4-turn ball valve on the vinyl tubing supply line to shut off the He flow temporarily.
   c. A Radiodetection MDG-2002 Helium gas detector was connected to a second side port on the shroud using 1/4-inch-OD vinyl tubing, and operated on its slowest pump speed.
   d. The shroud was then charged with the He as to a target concentration of 95% He (the range was 94% to more typically 98 %.)
   e. The ball valve on the He supply tubing was closed without changing the gas flow rate, the He detector removed, and the port on the shroud sealed airtight with a 1/4-inch plug.
   f. The MDG-2002 was operated in open air and, when the He cleared the tubing and the display zeroed-out, it was connected to the 1/4-inch-ID sampling tubing exiting the top of the shroud.
   g. The shroud assembly was then recharged with He at the preset flow rate, the MDG-2002 run on its slowest pump speed until the display stabilized, and the sample port leak rate recorded.

4. After leak testing, the shroud was carefully slid off the sampling tube and the end of the tubing secured airtight with a 1/4-inch-ID silicone rubber cap and plastic zip-tie. The location was then secured against being disturbed, and allowed to equilibrate for at least 72-hours before sampling.

NYSDOH SVI guidance allows ten-percent leakage, and the installed sample ports all exhibited acceptable leakage rates (see *Table 6*.)



Notes: ***For clarity the scale of the assembly is exaggerated compared to the thickness of the floor slab.***

CMS Associates Remediation Site
SVI Evaluation of 210 French Building

Figure 9

Sample Port
Leak Test Assembly

Ken W. Kloeber Consulting Engineers

Table 6

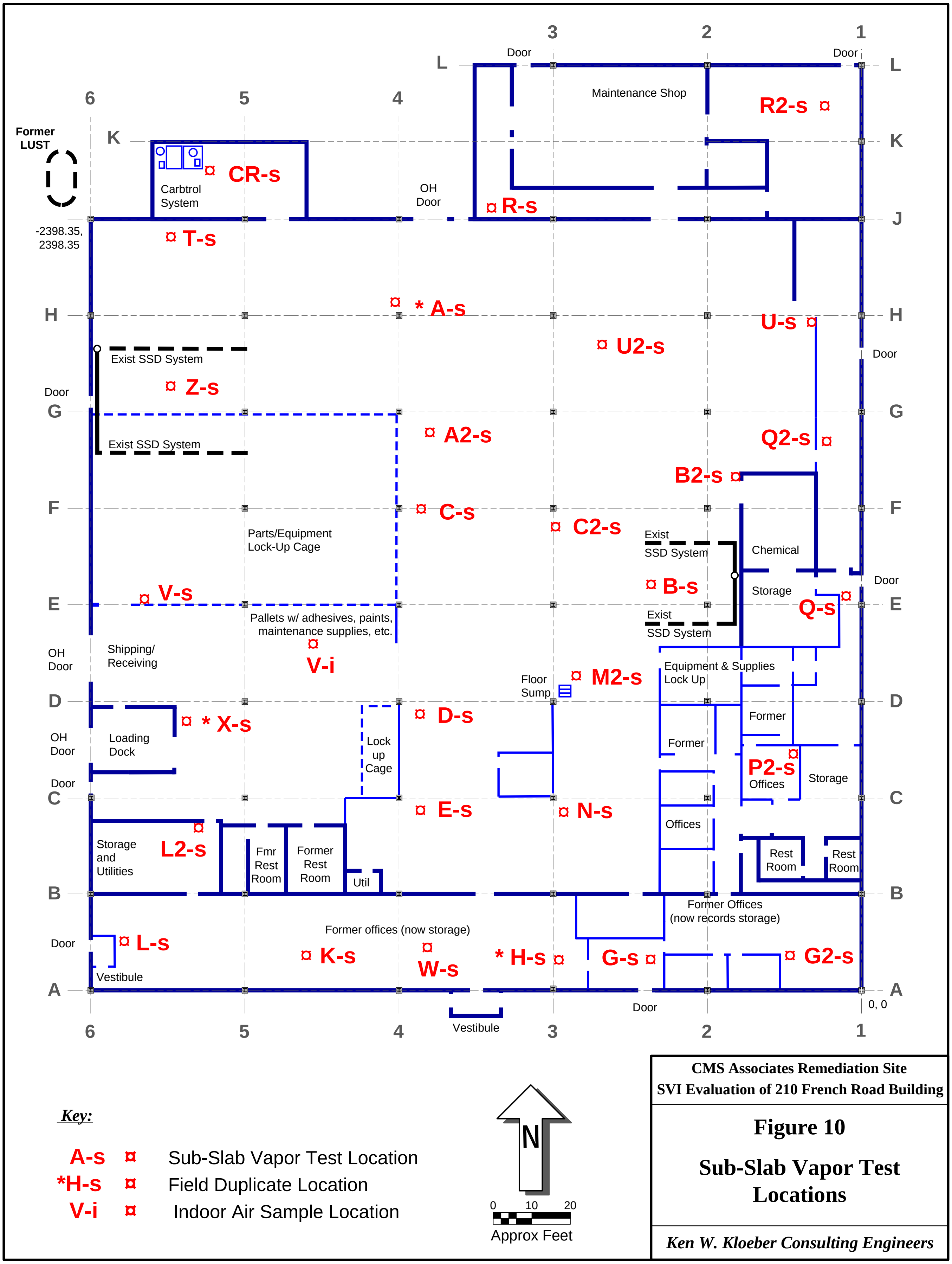
Sub-Slab Vapor Sampling Ports
Pre-Sample Leakage Tests

Location	Shroud He Concentration	Leakage	Notes
A*	98%	< 1%	*Field duplicate location
A2	99%	0%	
B	98%	0%	
B2	90%	0%	
C	98%	<1%	
C2	98%	< 1%	
CR	98%	0%	
D	98%	< 1%	
E	98%	<1%	
G	99%	<1%	
G2	99%	0%	
H*	99%	0%	* Field duplicate location
K	98%	0%	
L	95%	< 1%	
L2	98%	< 1%	
M2	98%	< 1%	
N	98%	<1%	
P2	99%	< 1%	
Q	99%	< 1%	
Q2	95%	0%	
R	97%	0%	
R2	95%	0%	
T	98%	0%	
U	98%	0%	
U2	98%	0%	
V	95%	< 1%	
W	98%	< 1%	
X*	94%	3%	*Field duplicate location
Z	99%	0%	

3.2.6 <u>Sub-Slab Sampling</u>

The sub-slab was sampled at 29 location (see *Figure 10,*) with field duplicates taken at three locations. Indoor-air was sampled at one point for control purposes to compare against the prior indoor-air sampling.

The first step to sample the sub-slab was to remove stagnant air from the sampling tubing that would be drawn into the Summa canister. Approximately three dead volumes was purged using a 30-ml plastic syringe connected to the PTFE-lined sampling line with a short connector of 1/4-inch-ID silicone tubing.


Former LUST
-2398.35, 2398.35
Carbtrol System
CR-s
T-s
OH Door
R-s
Door
Maintenance Shop
R2-s
* A-s
U2-s
U-s
Exist SSD System
Z-s
A2-s
Q2-s
B2-s
C-s
C2-s
Parts/Equipment Lock-Up Cage
Exist SSD System
Chemical
Storage
B-s
Q-s
V-s
Pallets w/ adhesives, paints, maintenance supplies, etc.
V-i
Shipping/ Receiving
Floor Sump
M2-s
Equipment & Supplies Lock Up
* X-s
Loading Dock
Lock up Cage
D-s
Former
Former
P2-s
Offices
Storage
E-s
N-s
Offices
L2-s
Storage and Utilities
Fmr Rest Room
Former Rest Room
Util
Rest Room
Rest Room
Former Offices (now records storage)
Former offices (now storage)
L-s
Vestibule
K-s
W-s
* H-s
G-s
G2-s
Vestibule
0, 0
Key:
A-s ¤ Sub-Slab Vapor Test Location
*H-s ¤ Field Duplicate Location
V-i ¤ Indoor Air Sample Location
N
0 10 20
Approx Feet
CMS Associates Remediation Site
SVI Evaluation of 210 French Road Building
Figure 10
Sub-Slab Vapor Test Locations
Ken W. Kloeber Consulting Engineers

The silicone connector remained in place after purging, was pinched closed by hand, and then slid onto the barbed hose adaptor on the Summa canister regulator and zip-tied airtight.

The valve on the Summa canister was opened to begin sampling and the beginning time and vacuum recorded. After 60 minutes, the end time and vacuum were recorded, and the valve closed. The chain-of-custody was then completed and the canister tagged with appropriate information, removed from the sampling port, and immediately boxed for shipping to Con-Test.

After sampling, we leak tested the sub-slab sampling ports to assure that the vapor samples were representative and the analytical results could be relied upon. The results showed that all samples were intact—with leakage rates well below the NYSDOH 10% threshold (see *Table 7*.)

Table 7

Sub-Slab Vapor Sampling Ports
Post-Sampling Leakage Tests

Location	Shroud He Concentration	Leakage	Notes
A*	98%	< 1%	*Field duplicate location
A2	98%	0%	
B	98%	< 1%	
B2	98%	< 1%	
C	98%	2.5%	
C2	98%	< 1%	
CR	98%	0%	
D	97%	3%	
E	98%	< 1%	
G	98%	< 1%	
G2	98%	< 1%	
H*	98%	< 1%	* Field duplicate location
K	98%	< 1%	
L	98%	< 1%	
L2	98%	< 1%	
M2	98%	< 1%	
N	98%	2%	
P2	98%	< 1%	
Q	98%	< 1%	
Q2	98%	< 1%	
R	98%	<1%	
R2	98%	0%	
T	98%	< 1%	
U	98%	< 1%	
U2	98%	< 1%	
V	98%	0%	
W	98%	< 1%	
X*	98%	1%	*Field duplicate location
Z	98%	< 1%	

To complete the required locations, they were sequentially sampled the weekend of May 26, 2013, at approximate 5-minute intervals beginning 1650—with the last sample completed at 0940 the next morning.

Once the testing was complete, the end of the sub-slab sampling tubing was again sealed airtight with a silicone cap and zip-tied closed and the location secured against damage—so that we could use it for future sub-slab communication tests, and to evaluate the performance of the two existing Sub-Slab Depressurization Systems.

3.2.7 Floor Slab Remediation and Sub-Slab Communication Tests

During the 2010-2011 SVI evaluations in the 210 French Road building, we measured the area of influence of the two SSD Systems that were installed in 2005, and the blower suction was optimized.

During the 2013 SVI investigations, an inspection revealed cracks in the floor slab and some air leakage was observed around the poured-concrete patches in the slab, above the trenches installed for the two systems.

We had previously retained Mitigation Tech of Brockport, NY, to assist in evaluating the efficiency of the current blowers in order to improve their performance, and to determine whether they could, if necessary, be used to extend the SSD Systems' area of influence across the building footprint.

During the initial work, several substantial air leak points were discovered and the contractor's work scope was expanded to include inspecting and remediating the floor slab by locating and sealing all leaks that it could identify. The scope of the *SVIE Work Plan* was modified for that additional work and was approved by the NYSDEC in July 2013 (see *Appendix A.*)

Substantial leak points in the floor slab were identified, and investigation/slab remediation work occurred on June 30, July 3, and July 13, 2013, to seal the located leaks.

IV SOIL VAPOR INTRUSION EVALUATION

4.1 SVIE Methodology and Analytical Protocol

4.1.1 Methodology

To evaluate the 210 French building on the CMS Remediation Site for the impact of soil vapor intrusion, we used this methodology as generally outlined in the *SVIE Work Plan.*

1. Evaluated the site and building for its potential impact from soil vapor intrusion.
    - Described in Section 2.1, Section 2.2, and Section 2.3

2. Divided the building slab and interior into areas based on construction, use, and potential VOCs in order to situate appropriate sampling points.
    - Described in Section 3.2.2

3. Inspected the building envelope to determine possible SVI pathways.
    - Described in Section 3.2.7 and see Section 4.2

4. Inspected stored chemicals, solvents, and other sources that might contribute to indoor air VOC contamination.
    - See Section 4.5

5. Sampled indoor air, outdoor ambient air, and sub-slab vapor.
    - See and Figure 6, and Figure 10

6. Had all samples analyzed under EPA Compendium Method TO-15 by a NYSDOH-certified air laboratory, requested the analytical work and reporting be to NYSDEC *ASP Level B* protocol, and per *DER-10* had the analytical data packages validated by a qualified independent data validator.
    - See Section 4.1.2

7. Determined whether the blowers installed on the two current Sub-Slab Depressurization Systems deliver adequate vacuum to the sub-slab remediation piping, adjusted them for maximum efficiency, and evaluated whether they could be used to expand the SSD Systems.
    - See Section 4.2

8. Remediated the floor slab by locating and sealing air leaks in order to maximize VOC capture under the slab immediately, by extending the extent of the reduced-pressure zone.
    - See Section 4.3

9. Performed sub-slab communication tests, and determined the efficiency of and extent of the reduced-pressure zones created by the current Sub-Slab Depressurization Systems.
    - See Section 4.4 and Figure 11

10. Took into account the ambient air sample results, and evaluated indoor air and sub-slab results for these seven compounds using the NYSDOH *Sub-Slab Vapor/Indoor Air Matrix 1 and Matrix 2 in* Section 4.1.2:

   - *Carbon Tetrachloride*
   - *Trichloroethene* (*TCE*)
   - *Vinyl Chloride*
   - *1,1,1-Trichloroethane* (*1,1,1-TCA*)
   - *1,1-Dichloroethene* (*1,1-DCE*)
   - *cis-1,2-Dichloroethene* (*cis-1,2-DCE*)
   - *Tetrachloroethene* (*PCE*)

4.1.2 Analytical Protocol

All air and vapor samples were shipped to and analyzed by Con-Test Analytical Laboratory; East Longmeadow, MA, according to EPA Method TO-15 with the data package prepared under NYSDEC *Analytical Services Protocol Level B.*

The analytical results and laboratory quality assurance were reviewed and validated by Vali-Data of WNY, LLC (see *Appendix B* for the *Data Usability Summary Report* for each set of samples.)

Regulated compounds:

Carbon tetrachloride,
Trichloroethene (TCE)
Vinyl Chloride

Soil Vapor/Indoor Air Matrix 1
October 2006

SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m^3)	**INDOOR AIR CONCENTRATION of COMPOUND (mcg/m^3)** < 0.25	0.25 to < 1	1 to < 5.0	5.0 and above
< 5	1. No further action	2. Take reasonable and practical actions to identify source(s) and reduce exposures	3. Take reasonable and practical actions to identify source(s) and reduce exposures	4. Take reasonable and practical actions to identify source(s) and reduce exposures
5 to < 50	5. No further action	6. MONITOR	7. MONITOR	8. MITIGATE
50 to < 250	9. MONITOR	10. MONITOR / MITIGATE	11. MITIGATE	12. MITIGATE
250 and above	13. MITIGATE	14. MITIGATE	15. MITIGATE	16. MITIGATE

Regulated compounds:

1,1-Dichloroethene (1,1-DCE)
1,1,1-Trichloroethane (1,1,1-TCA)
cis-1,2-Dichloroethene
Tetrachloroethene (PCE)

Soil Vapor/Indoor Air Matrix 2
October 2006

SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m^3)	**INDOOR AIR CONCENTRATION of COMPOUND (mcg/m^3)** < 3	3 to < 30	30 to < 100	100 and above
< 100	1. No further action	2. Take reasonable and practical actions to identify source(s) and reduce exposures	3. Take reasonable and practical actions to identify source(s) and reduce exposures	4. Take reasonable and practical actions to identify source(s) and reduce exposures
100 to < 1,000	5. MONITOR	6. MONITOR / MITIGATE	7. MITIGATE	8. MITIGATE
1,000 and above	9. MITIGATE	10. MITIGATE	11. MITIGATE	12. MITIGATE

There were several rounds of analytical report revisions necessary pertaining to the reporting limits and presentation of data, apparently due to Con-Test not being familiar with ASP Level B requirements—which delayed the final reports and data validation. Issues/questions raised were eventually addressed by the lab to the satisfaction of Vali-Data, and Con-Test Analytical Laboratory issued the final data packages in July 2013, for the indoor air samples (see *Appendix D*) and in March 2014, for the sub-slab vapor samples (see *Appendix E*.) The final DUSR packages for both are presented in *Appendix B*.

The analytical data obtained during the 2010-2011 sub-slab vapor sampling were used to evaluate the 210 French Road building for the potential for SVI impact and to conclude that additional sampling was appropriate to determine indoor air quality.

That 2010-2011 analytical results are presented in *Appendix C*. Although in 2010-2011 we followed the same sampling procedures as in 2013, the reporting was not to NYSDEC *ASP Level B* protocol—so a DUSR could not be prepared for the analytical work. Therefore, only the current 2013 analytical results were used to evaluate SVI impact in the 210 French Road building.

4.2 Construction and Efficiency of Existing SSD Systems

Both SSD Systems consist of 4-inch, perforated PVC pipe buried in 2-foot-wide by 2-foot-deep, stone-filled trenches, installed on approximately 20-foot centers beneath the slab. The floor slabs had been patched in 2005 with concrete above the four stone trenches.

The east system is located in the east-central floor area of the warehouse and consists of ~50 feet of suction pipe buried beneath the concrete floor slab (see *Figure 6* and *Photo Plate 1.)*

The west system is near the northwest corner of the building and the location of the former LUST. It consists of ~80 feet of buried suction pipe (see *Photo Plate 2*.) As the photos show, both SSD Systems have their blowers and suction manifold piping situated inside the building envelope, against the adjacent concrete-block walls.

During the ongoing SVI work in 2010-2011, we measured the differential pressures created in the suction manifold piping by the two blowers as they had been installed in 2005, and adjusted the blower choke plates to maximize that differential. In that way, the systems would capture maximum VOCs from the sub-slab trenches. While definite improvements were observed, they were not dramatic—the systems had been operating at near peak vacuum since they were installed.

We installed pressure test points around each SSD System, and measured the areas of influence and found it extended only 20 to 30 feet beyond the under-slab VOC capture trenches. Since additional work in the building was necessary relative to indoor-air testing and possible follow-up sub-slab testing, no further investigation of the systems was performed in 2011.

CMS Associates Remediation Site
SVI Evaluation of 210 French Road Building

Photo Plate 1

Sub-Slab Depressurization System
On East Interior Wall of Building

Ken W. Kloeber Consulting Engineers

CMS Associates Remediation Site
SVI Evaluation of 210 French Road Building

Photo Plate 2

Sub-Slab Depressurization System On West Exterior Wall of Building

Ken W. Kloeber Consulting Engineers

The five-inch-thick concrete floor slab was in fair to good condition, with many cracks and seams observed that could be pathways for soil vapor to enter the building envelope. There is one in-slab floor pit in the central area that drains to the building sewer.

For the 2013 SVI investigations, remediation contractor Mitigation Tech of Brockport, NY, was retained to assist with:

1. Evaluating the efficiency of the current blowers to determine if they were the best units for the application and to possibly improve their performance

2. Sub-slab communication tests and to help determine more precisely the bounds of the reduced-pressure zone imparted by both SSD Systems.

3. Evaluate the potential of using the current blowers to, if necessary, extend the area of influence beyond its current extent and possibly into other portions of the building footprint.

4.3 2013 Remediation of Warehouse Concrete Floor Slab

During the initial SVI inspections, air leaks in the floor slab were noted, and we expanded the contractor's work scope to include inspecting and remediating the floor slab by:

1. Inspecting the slab and locating as many potential areas of leakage as could be identified.

2. Cleaning and readying the leak areas so they could be sealed.

3. Sealing all cracks, perimeter joints, floor protrusions, and other leak points.

Substantial leaks were located around steel column bases and perimeter joints in the central warehouse area, in Rosina's spare parts lock-up cage, in the northwest warehouse room (immediately south of and adjacent to the "Carbtrol room",) and in the extreme northeast corner of the building. The largest leaks identified were at the joints in the repaired floor slab above the SDS System trenches, perimeter joints, and around pipe penetrations in the concrete floor.

The contractor's work scope was renegotiated to include remediating the floor slab by sealing all leaks that it reasonably could identify without moving massive areas of Rosina palletized packaging materials that cover nearly the entire central warehouse floor. The scope of the SVIE Work Plan was modified for the additional investigation and remediation work, and was approved by the NYSDEC in July 2013 (see *Appendix A*.)

Accessing the leak areas required Rosina Food Products to move several pieces of large, heavy equipment, and spare parts and motors, and shelving out of the parts cage. Remediation work occurred on June 30 and July 3 (during a Rosina holiday work shutdown,) and on July 13, 2013. All identified leaks were sealed using polyurethane sealant (for small-width cracks and joints,) and for larger cracks and perimeter joints, closed-cell-foam backer rod and polyurethane sealant was used.

4.4 Extent of Current SVI Remediation and Reduced-Pressure Zone

The 210 French Road contains spare production equipment, replacement parts, site and building maintenance supplies and equipment, and product packaging and shipping materials warehoused in the central and north portion of the building. That area is surrounded by a wall footer that affects the ability of the reduced-pressure zone to extend beyond into other parts of the footprint.

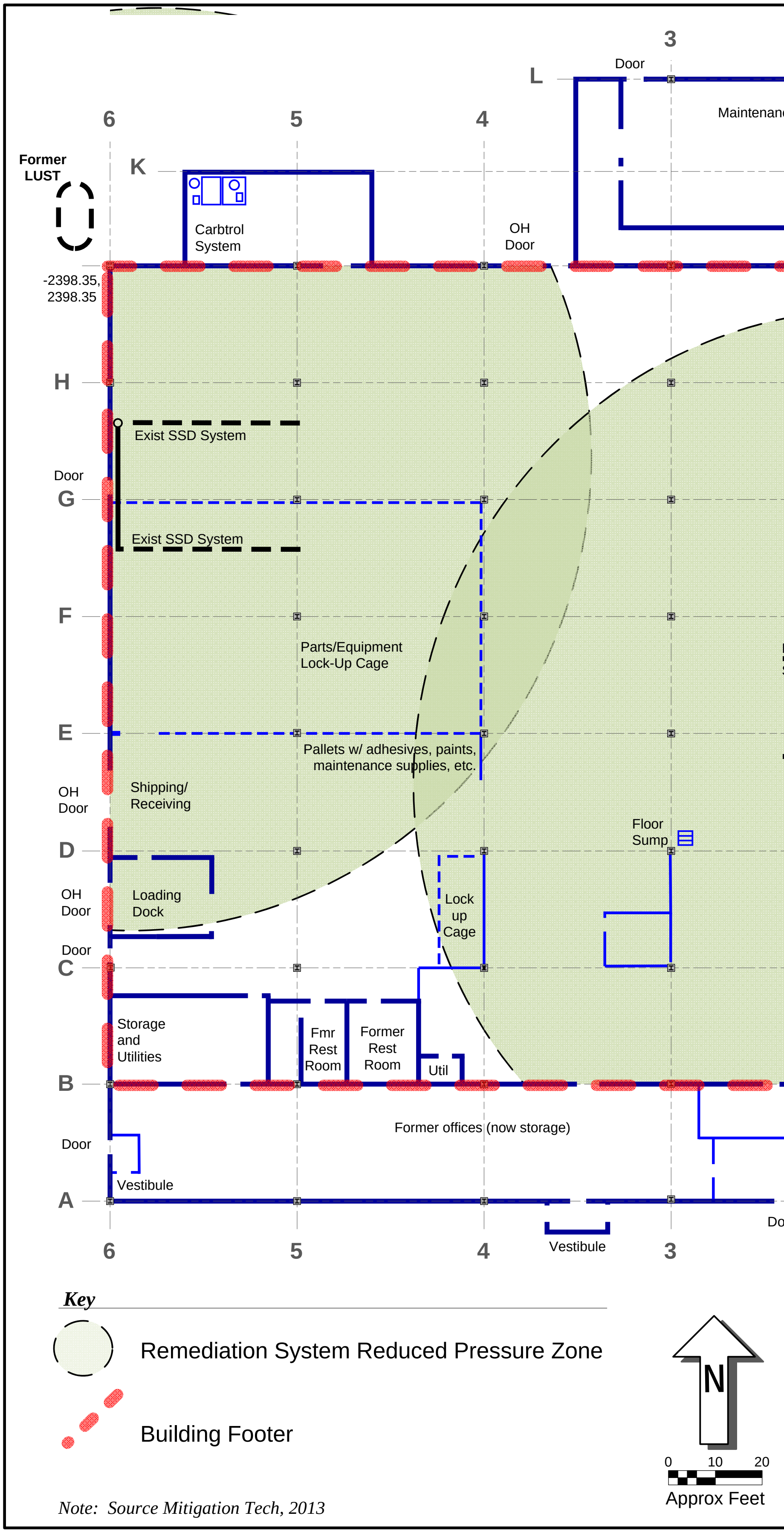
Figure 11 depicts the extent of the combined sub-slab reduced-pressure zone that is created by the SSD Systems on the east and west sides of the building. This was determined by Mitigation Tech during and subsequent to its remediation of the concrete floor (see report in *Appendix H.)* The blowers on the two systems have some excess capacity, which may allow them to be used to extend the reduced-pressure zone across the central footprint.

4.5 Factors Affecting SVI and Indoor-Air VOCs

The central portion of the building is where the palletized product packaging/shipping materials are stored before they are moved as needed to the Rosina manufacturing facility next door via battery-powered and occasionally propane-fueled forklifts that operate in the 210 French Building. The north end (beyond the footer) contains the Carbtrol groundwater extraction/treatment system (in the “Carbtrol room” on the northwest corner) and a maintenance shop on the northeast corner to fabricate production equipment repairs, and for general equipment repair/maintenance.

There is no central HVAC in the building, and only individual electric space heaters are used in the parts cage—which is the only area that is normally occupied. Typically, one employee per shift maintains inventory, shelves parts received, and distributes materials. As materials are received in the warehouse, an employee will move them to the storage areas by forklift, and then leave the building. Likewise, when materials are required at the Rosina building next door, an employee will transport them across the parking lot via forklift.

There is large, wire-cage parts storage area on the west side of the warehouse, and outside the cage there is palletized storage of some new but mostly partially used building and other maintenance supplies such as paints, solvents, roofing cements, and other VOC-laden products. There were no open chemicals, cleaners, or solvent containers, and no other source of VOCs readily observed that would substantively contribute to indoor air contamination. Nevertheless, solvents and other VOCs could be used at any time in and around the maintenance room on the north end.



CMS Associates Remediation Site
SVI Evaluation of 210 French Road Building

Figure 11

Remediation System Reduced Pressure Zone

Ken W. Kloeber Consulting Engineers

4.6 Evaluation of Indoor Air and Sub-Slab Samples

Appendix J presents a summary of the results of the SVI sampling performed at 210 French Road.

Because the building is a largely open structure inside, circulation of indoor can be dramatic. Therefore SVI impact is most appropriately evaluated on a "total-building" basis. That is, it is best NOT to compare results at any individual sub-slab test location against a given indoor air sample, as we would do for a residence or smaller commercial structure.

That is because if any VOCs enter the building envelope, they would be quickly transported away from source. Therefore, individual indoor samples would typically have no direct correlation to any given sub-slab sample. Rather, the evaluation was performed by looking across the entire footprint and evaluating the results "*in total*" against the NYSDOH SVI decision Matrix 1 and Matrix 2.

The plots of these "total building" evaluations are likewise presented with the summary of analytical results (see *Appendix J*.)

The results show that—for the seven NYSDOH regulated VOC compounds:

1. The indoor air quality generally falls into the lowest two categories on both Matrix 1 and Matrix, and is not a concern at this time.

2. VOCs levels remain very high under the floor slab, and could contribute to reduced air quality should pathways exist to introduce soil vapor into the building envelope.

The combination of regulated VOCs the two (indoor air and sub-slab vapor samples) indicates that the remainder of the floor slab should be remediated by extending the reduced pressure zone across the building footprint. Nevertheless, the current SSD Systems cover a majority of that footprint, so extending the reduced-pressure zone becomes a less onerous task. The existing blowers will be be able to handle some, but not all of the increase to the remediated footprint.