SUB-SLAB DEPRESSURIZATION SYSTEM
DESIGN WORK PLAN

BCP Site #C915312
155 CHANDLER STREET
BUFFALO, NEW YORK

Prepared for:
R & M Leasing LLC
391 Washington Street
Buffalo, New York 14203

Prepared by:
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APPENDIX A

1.0 INTRODUCTION

This document presents a Work Plan for the design and installation of additional sub-slab depressurization systems (SSDSs) at the R & M Leasing LLC ('R&M') property located at 155 Chandler Street, Buffalo, New York ('Property'), as depicted in Figure 1. Schenne and Associates ('Schenne') has prepared this Work Plan at the request of Environmental Advantage, Inc., ('EA') on behalf of R&M.

The structure of this SSDS Design work plan has been prepared in general conformance with requirements set forth in the New York State Department of Environmental Conservation (NYSDEC) *Technical Guidance for Site Investigation and Remediation, May 2010* (DER-10), the New York State Department of Health (NYSDOH) *Final, Guidance for Evaluating Soil Vapor Intrusion in the State of New York, October 2006* (updated May 2017), and the Site Management Plan for the Pierce Arrow Business Center, 155-157 Chandler, Erie County, Buffalo, New York. Pilot/communication testing for SSDS Design will commence within 30 days of the NYSDEC/NYSDOH approval of this work plan.

1.1 Property Description

The Property consists of a 2.35-acre parcel in a commercial/industrial setting, with residential development immediately to the south of the Property. R&M currently owns the on-site building and has rehabilitated the space for residential, industrial and commercial purposes. The Property contains an approximate 65,000-square foot building, 22,000-square foot courtyard within the central area of the building and an approximate 0.39 acre parking lot area. The building is surrounded on three sides by paved access roads and parking areas. The general Property layout is presented in Figures 2 and 3.

1.2 Property History

The Linde Air Products Company factory was built on the Property in phases from 1907 to 1959, with a majority of the building being constructed between 1907 and 1948. The building has a C-shaped plan that is nearly fully enclosed with a courtyard in the center. The footprint of the red brick factory is approximately 300 feet wide by 275 feet deep in size. The earliest portions of the building consist of two-story solid masonry construction with double-hung wood windows, brick piers and pitched roofs along the northern half of the existing building. Though portions of the northern half of the building are two stories in height while the southern and eastern sections are only a single story, the construction of much of the building resulted in the one-story sections often being as tall or taller than the two-story sections.

As the Linde Air Products Company grew into America's largest liquid oxygen manufacturing company, it both built new facilities and expanded the Chandler Street factory to the south, east and west. The building's periods of growth generally coincide with the company's takeover by the Union Carbide Company, which changed the focus of the factory from oxygen production to machinery repair and research development. In 1951, Bell Aircraft occupied the building, constructing several one-story cinder-block additions in 1952 that projected into the courtyard, as well as introducing cinderblock partitions throughout several of the wings. It latter years the building was occupied by a number of industrial companies.

R & M Leasing LLC purchased the Property in 2017, and Brownfield Cleanup Agreement (BCA Index No. C915312-02-17[1]) was executed on April 24, 2017 for the Property, which identified the property as Site # C915312 ('Site') with the NYSDEC under the Brownfield Cleanup Program ('BCP'). A number of cleanup measures were implemented at the Site as detailed in the BCP Site Final Engineering Report ('FER')[2], including:

- Asbestos abatement of the buildings and grounds;
- Excavation of 5,500 tons of contaminated soil and concrete from the Site grounds and building for off-site disposal; and
- Four (4) sub-slab depressurization systems (Figure 4) to mitigate or eliminate chlorinated hydrocarbon vapor intrusion to the interior air space of the building.

A certificate of completion (COC)[3] was issued on December 27, 2017, and the Site has operated in accordance with its Site Management Plan[4] since.

1.3 Design Objectives and Goals

The purpose of this SSDS Design Work Plan is to document that the SSDS design objectives and performance goals are achievable following complete system installation. The system objectives and performance goals include the following elements:

- Reduce and maintain indoor air concentrations in the areas of concern to below the levels listed on Table 3.1 Air guideline values derived by the NYSDOH, as amended, from the NYSDOH Air Guidance document.
- Mitigate potential vapor migration by maintaining a minimum pressure differential of at least of 0.25-inches of water column (In. W.C.) beneath the existing 155 Chandler Street building slab in the areas of concern, measured by the exhaust piping manometer located 5-feet above the finished floor so as to prevent vapors from entering the indoor air of the building, while also releasing the trapped vapors beneath the various slab areas.
- In each area of concern, demonstrate an applied zone of influence in the vicinity of the vacuum trench associated with the proposed individual SSDS fan.
- Demonstrate both systems' effectiveness while maintaining for continuous operation of the SSDS, with no significant non-operating time.
- Reduce and maintain indoor air concentrations in the areas of concern to below the levels listed in Matrix A, Matrix B, and Matrix C of the NYSDOH "Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York", specifically analyte concentration recorded above 1 ug/m^3, 10 ug/m^3, and 0.2 ug/m^3, respectively.

1 Brownfield Cleanup Agreement for the Pierce Arrow Business Center Site, executed between NYSDEC and R & M Leasing LLC and Signature Development WNY LLC, April 24, 2017.

2 "Final Engineering Report; Brownfield Cleanup Program for Pierce Arrow Business Center, 155-157 Chandler, Buffalo, New York 14207; BCP # C915312" prepared by Hazard Evaluations, Inc., and Schenne & Associates, December 2017.

3 New York State Department of Environmental Conservation, "Certificate of Completion for the Pierce Arrow Business Center", dated December 27, 2017

4 "Pierce Arrow Business Center, 155-157 Chandler, Erie County, Buffalo, New York, Site Management Plan NYSDEC Site Number: C915312" prepared by Hazard Evaluations, Inc. and Schenne & Associates for R&M Leasing LLC, dated December 2017

2.0 NATURE AND EXTENT OF CONTAMINATION

Sub-slab air/vapor samples collected beneath the northwest corner of the building at 155 Chandler Street identified CVOCs at concentrations that require mitigation in accordance with the New York State Department of Health (NYSDOH) decision matrices. Additional details are provided in the paragraphs below:

2.1 Baseline Indoor Air Quality Assessment – September 2017

To assess the potential for vapor intrusion at the Site, baseline indoor air and sub-slab vapor sampling was conducted by Hazard Evaluations, Inc. ('HEI') in September 2017 as part of a Remedial Investigation/Interim Remedial Measures (RI/IRM) project[5]. A full USEPA TO-15 scan was conducted, which included typical chlorinated volatile organic compounds (cVOCs) of concern, including trichloroethene (TCE), cis-1,2-dichloroethene (cis-DCE), 1,1-dichloroethene (11-DCE), carbon tetrachloride (CT), tetrachloroethene (PCE), 1,1,1-trichloroethane (111-TCA), methylene chloride (MC), and vinyl chloride (VC) at five (5) sub-slab locations and six (6) pre-selected indoor air locations throughout the building, as well as one (1) pre-selected outdoor location. The findings of the 2017 Baseline Vapor Intrusion Assessment are summarized as follows:

NYSDOH Air Guideline Values

Methylene chloride was identified in a single indoor air sample at concentrations above NYSDOH air guideline value ('AGV') as listed in Table 3.1 of the NYSDOH Guidance document. The concentration of methylene chloride was 150 ug/m^3 in sample IA-4. As methylene chloride was detected in the sub-slab sample at a much lower concentration than the indoor air sample (2.6 ug/m^3), the source of the methylene chloride was not likely sub-slab intrusion, but an indoor air sours which may likely be related to construction activities occurring at the time of sample collection.

Soil Vapor/Indoor Air Matrices

TCE was detected in three of the five sub-slab samples at concentrations ranging from 2.2 ug/m^3 at SS-2 to 3,500 ug/m^3 at SS-4. TCE was also detected in four of the six indoor air samples at concentrations ranging from 0.27 ug/m^3 at IA-3 to 1.7 ug/m^3 at IA-4. All four indoor air sample results for TCE were below the NYSDOH AGV of 2 ug/m^3.

Matrix A from the NYSDOH guidance indicated that the SS-3/IA-3 and SS-4/IA-4 locations/areas would require mitigation due to the elevated sub-slab and corresponding indoor air concentrations.

Carbon Tetrachloride was detected both at four of the five sub-slab locations at concentrations ranging from 1.4 ug/m^3 at SS-6 to 41 ug/m^3 at SS-3 and five of the

[5] "Final Remedial Investigation-Interim Remedial Measures-Alternative Analysis Report; Brownfield Cleanup Program For Pierce Arrow Business Center; 155-157 Chandler, Buffalo, New York, 14207; BCP # C915312", prepared by Hazard Evaluations, Inc., and Schenne & Associates, December 5, 2017.

six indoor air samples at concentrations ranging from 0.57 ug/m^3 at IA-4 to 0.69 ug/m^3 at IA-2.

Matrix A from the NYSDOH guidance indicated that the SS-3/IA-3 and SS-4/IA-4 locations/areas would require monitoring due to the elevated sub-slab and corresponding indoor air concentrations.

Methylene chloride was detected in all five sub-slab samples at concentrations ranging from 2.0 ug/m^3 at SS-1 to 2.9 ug/m^3 at SS-2. Methylene chloride was also detected in all six indoor air samples at concentrations ranging from 1.6 ug/m^3 at IA-3 to 150 ug/m^3 at IA-4.

Matrix B from the NYSDOH guidance indicated that the SS-4/IA-4, locations/areas would require the source(s) to be identified and resampled, or would require mitigation due to the elevated sub-slab and corresponding indoor air concentrations.

PCE was detected in four of the five sub-slab samples at concentrations ranging from 0.95 ug/m^3 at SS-2 to 340 ug/m^3 at SS-4. PCE was also detected in all six indoor air samples at concentrations ranging from 0.68 ug/m^3 at IA-5 to 1.2 ug/m^3 at IA-3. All six indoor air sample results for PCE were below the NYSDOH AGV of 30 ug/m^3.

Matrix B from the NYSDOH guidance indicated that no further action was recommended for PCE at any of the SS/IA locations/areas.

cis-DCE and 1,1,1-TCA were detected in sub-slab sample SS-4 at a concentration of 3.3 ug/$m^3$and 62 ug/m^3, respectively. VC was detected in sub-slab sample SS-6 only at a concentration of 0.66 ug/m^3. 1,1-DCE was not detected in any of the sub-slab or indoor air samples.

2.2 2022 Indoor Air Quality Assessment

To assess the suspect CVOC vapor intrusion at the Site which was identified through annual Site Management Plan (SMP) compliance sampling conducted between 2018 and 2021, indoor air and sub-slab vapor sampling was conducted by EA in March, June and July 2022 as detailed in the March 2022 SVI Investigation Report[6] and the June 2022 Supplemental SVI Investigation Report[7] in the general area of the building occupied by the Blackbird Cider Works ('Cidery') and a basement storage room, elevator shaft and reception area used by ODL Orthodontic Lab ('ODL'). A full USEPA TO-15 scan was conducted at a total of seven (7) sub-slab locations and seven (7) corresponding ambient indoor air locations throughout the building, as well as three (3) additional indoor locations, two (2) ambient outdoor locations, and

[6] A Draft "Soil Vapor Intrusion Investigation Report" for Pierce Arrow Business Center, 155-157 Chandler Street, Buffalo, NY" prepared by Environmental Advantage, Inc., dated April 30, 2022 was submitted to the Department on May 13, 2022. The final "March 2022 Soil Vapor Intrusion Investigation Report" for Pierce Arrow Business Center, 155-157 Chandler Street, Buffalo, NY" prepared by Environmental Advantage, Inc., dated August 10, 2022 was submitted to the Department on August 10, 2022.

[7] " Supplemental Soil Vapor Intrusion Investigation Report-June 2022" for Pierce Arrow Business Center, 155-157 Chandler Street, Buffalo, NY" prepared by Environmental Advantage, Inc., dated September 21, 2022.

one (1) rooftop location. The findings of the 2022 Air Quality Assessment are summarized as follows:

NYSDOH Air Guideline Values

TCE was identified in four indoor air samples at concentrations above NYSDOH AGV. The concentration of TCE was 24.1 ug/m^3, 25.5 ug/m^3, 39.2 ug/m^3, and 2.09 ug/m^3 in samples IA-7(032922), IA-9(032922), IA-10(032922), and IA-15(072822), respectively. **Please Note**: Plastic sheeting was hung to completely segregate the air in each room when samples IA-7(032922), IA-9(032922) and IA-10(032922) were collected. Reported elevated concentrations of TCE are suspected to reflect restricted air circulation in these areas, as the corresponding sub-slab concentrations identified do not support the elevated indoor ambient results. This monitoring segregation was not duplicated during follow-up sampling events due to the lack of apparent sub-slab source areas. Sample IA-15(072822) was collected from a subgrade unoccupied and closed off room.

Soil Vapor/Indoor Air Matrices

TCE during this 2022 monitoring event was detected in six of the seven sub-slab samples at concentrations ranging from 7.09 ug/m^3 at SS-9(032922) to 5,800 ug/m^3 at SS-12(061422). TCE was also detected in five of the seven corresponding ambient indoor air samples at concentrations ranging from 0.247 ug/m^3 at IA-13(061422) to 39.2 ug/m^3 at IA-10(032922). All three of the March 2022 indoor air sample results for TCE were above the NYSDOH AGV of 2 ug/m^3, and the immediate action level of 20 ug/m^3. All of the June 2022 indoor air sample results for TCE were below the NYSDOH AGV of 2 ug/m^3.

Matrix A from the NYSDOH guidance indicated that the SS-7/IA-7, SS-9/IA-9, SS-10/IA-10, and SS-12/IA-12 locations/areas would require mitigation due to the elevated sub-slab and corresponding indoor air concentrations. SS-13/IA-13 would require monitoring due to the elevated sub-slab and corresponding indoor air concentrations. SS-11/IA-11 should also be monitored due to the elevated sub-slab concentration and diluted corresponding indoor air sample.

Carbon tetrachloride was detected at six of the seven sub-slab locations at concentrations ranging from 2.47 ug/m^3 at SS-11(061422) to 47,500 ug/m^3 at SS-12(061422) and all seven of the indoor air samples at concentrations ranging from 0.371 ug/m^3 at IA-11(061422) to 8.05 ug/m^3 at IA-9(032922).

Matrix A from the NYSDOH guidance indicated that the SS-9/IA-9 and SS-12/IA-12 locations/areas would require mitigation due to the elevated sub-slab and corresponding indoor air concentrations. The SS-7/IA-7 and SS-10/IA-10 locations/areas would require the source(s) to be identified and resampled or mitigated due to the elevated sub-slab and corresponding indoor air concentrations.

PCE was detected in two of the seven sub-slab samples at concentrations ranging from 1.45 ug/m^3 at SS-9(032922) to 355 ug/m^3 at SS-8(061422). PCE was also detected in all seven indoor ambient air samples at concentrations ranging from 0.149 ug/m^3 at IA-13(061422) to 147 ug/m^3 at IA-11(061422). All three of the March 2022 indoor air sample results for PCE were below the NYSDOH AGV of 30 ug/m^3. Three of the four June 2022 indoor air sample results for PCE were above the NYSDOH AGV of 30 ug/m^3. None of the March or June 2022 indoor air sample results were above the immediate action level of 300 ug/m^3 for PCE.

Matrix B from the NYSDOH guidance indicated that the SS-8/IA-8 location/area would require mitigation due to the elevated sub-slab and corresponding indoor air concentrations. SS-11/IA-11 and SS-12/IA-12 should also be monitored due to or the source(s) to be identified and resampled or mitigated due to the elevated indoor air concentrations in exceedance of the NYSDOH AGV.

During the 2022 vapor sampling cis-DCE was detected in sub-slab sample SS-11 at a concentration of 1.33 ug/m^3, and in three of the seven indoor air sample locations at concentrations ranging from 0.369 ug/m^3 in IA-7(032922) to 0.48 ug/m^3 in IA-SS-10(032922). Methylene chloride was detected in sub-slab sample SS-9(032922) at a concentration of 1.99 ug/m^3, and in indoor air sample IA-12(061422) at a concentration of 2.34 ug/m^3. 1,1-DEC, 1,1,1-TCA, and VC were not detected in any of the sub-slab or corresponding ambient indoor air samples in 2022. No action is recommended for cis-DCE, 1,1-DEC, MC, 1,1,1-TCA, or VC.

Please Note: The highest concentration of methylene chloride detected during the 2022 vapor sampling was 2.34 ug/m^3, with most results below detection limits. This supports the initial determination that the 2017 source of methylene chloride was likely associated with construction activities occurring at the time of sample collection. Results of the 2022 Air Quality Assessment were compared to the recommended actions outlined by the NYSDOH Decision Matrices is presented in Table 1.

3.0 SSDS DESIGN AMD INSTALLATION

Analytical testing for CVOCs was conducted over several events in the Cidery and ODL areas of concern within the northwest portion of the building, including a basement storage area. Based on indoor sample results, intrusion is apparent from sub-slab areas to the indoor air in portions of these two areas of concern (Figure 5). The installation of separate SSDS systems in portions of both the Cidery and the ODL area is proposed. The scope of work includes the following:

- Installation of vapor extraction points and monitoring points;
- Installation of piping from each extraction point to a manifold or a separate exhaust, as applicable; and
- Installation of SSDS equipment (blower/fan, instrumentation where required).

The overall objective of these SSDSs is to limit the potential intrusion of sub-slab soil CVOC vapors into the indoor air of these specific areas of concern in the 155 Chandler Street building.

3.1 Pilot Testing

The purpose of this testing is to collect sub-floor slab flow data obtained through the use of a temporary vacuum system that incorporates in-floor valves and vacuum gauges. In-floor valves and vacuum gauges which reach the selected sub-floor area of the Cidery and ODL and attach a vacuum system which is vented to the building exterior using flexible pipe. A hammer drill will be used to install vacuum monitoring points at several locations in each area. The monitoring points, which will include a ¾-inch female coupling and threaded cap, will be installed to a depth that extends just below the surface of the concrete slab. The sub-floor vacuum levels under various areas of the floors will be adjusted to determine the extent to which vacuum blowers will be able to properly collect and exhaust CVOCs to minimize the potential for infiltration into the building interior atmosphere. The total number of monitoring points will reflect the results obtained at the Site. The only deliverable for this project will be the final engineered determinations for the number of extraction points and the sizing of blowers/fans to properly operate the existing system. It is possible other options may need to be discussed depending upon the results of the pilot testing. Pilot testing will commence within 30 days of the NYSDEC/NYSDOH approval of this work plan. SSDS installation will commence within 60 days of obtaining the appropriate equipment as determined by the results of the pilot testing.

3.2 Extraction Points, Piping Network & Fans

Any extraction point piping network will consist of 4-inch diameter schedule 40 polyvinyl chloride (PVC) piping with 0.020-inch slot screen extending just below the concrete floor slab at each vacuum trench floor location. The PVC screen will connect to a 4”-inch diameter PVC riser pipe with a screen-covered 90-degree elbow connector piece installed just below the slab so that only the riser pipe penetrates the floor. Extraction point vacuum trenches will be backfilled with washed #2 stone and covered with a new 4” concrete floor. The vacuum trenches will be sealed with foam backer rod and polyurethane self-leveling caulk and allowed to sufficiently dry according to manufacturer specifications prior to activation of the system. The riser will have a 4-inch ball valve for shutting off flow and balancing the system, where required. Extraction point details are included in Figure 6.

Depending on the results of the pilot connectivity testing, any additional horizontal sub-slab piping network determined to be necessary will be installed within a vacuum trench containing one 5-foot length of 4-inch diameter schedule 40 PVC perforated piping wrapped with 0.02 inch screen installed just below the concrete floor slab extending from each associated extraction point. The extension trench PVC pipe will connect to the 4”-inch diameter PVC 90-degree elbow connector piece installed just below the slab so that only the riser pipe penetrates the floor. The riser will have a 4-inch ball valve for shutting off flow and balancing the system, where required. Vacuum trenches will be backfilled with washed #2 stone and covered with a new 4” concrete floor. The extension vacuum trenches will be sealed with foam backer rod and polyurethane self-leveling caulk, and will be allowed to sufficiently dry according to manufacturer specifications prior to activation of the system. There are no currently proposed vapor extraction extension trenches. However, based on the pilot testing results, the actual extraction point

locations may need to be adjusted in the field during installation to accommodate existing equipment and operations

Each network of vacuum pipes will be installed to convey CVOC vapors from each extraction point and/or extraction point and trench to an exterior wall-mounted fan located outside of the building. Each 4-inch diameter vertical riser from the vapor extraction points within either the Cidery's seating/event area and through ODF's unoccupied basement room will be supported on columns or walls with pipe supports placed near valves, elbows, fittings, and points. All piping will be slightly sloped toward the vapor extraction points to prevent condensate accumulation in pipe runs or from affecting the fans. The final vertical 4-inch diameter PVC pipe that will be extended along the exterior building wall and raised to above the roof line to the fans at the exterior locations; however, piping networks from neither area of concern are it anticipated to penetrate the roof diaphragm.

Currently, it is assumed that RadonAway HS5000E fans (16 SCFM at 35 inches WC) will be utilized to maintain a pressure differential of 0.002 inches WC in the sub-slab in each area of concern. Based on the pilot testing data, as well as emissions rate calculations results, any requirements for vapor phase carbon treatment for the fan exhaust will be determined. Appendix A presented fan specifications.

Each fan will be equipped with an automatic shut-off alarm and will also include interior-mounted manometers installed at eye level to provide a visual indication to tenants and occupants that the systems are operating optimally. In the event that a fan loses power or vacuum, an audible and visual alarm will be initiated. A rain cap will be mounted to the pipes on the roof to help disperse exhaust and control rain water potentially entering the fan.

During SSDS installation activities, the Department-approved Site Management Plan (SMP), Excavation Work Plan (EWP), and Community Air Monitoring Plan (CAMP) will be followed. A Request to Import Form will be submitted to the Department and approved prior to the import of any #2 stone or similar material to be utilized for the project. Any soils/fill generated during SSDS installation will be drummed, characterized, and managed at a permitted Part 360 registered facility. Any concrete generated during SSDS installation will also be managed at a permitted Part 360 registered facility.

3.3 Post-Installation System Startup and Testing

Subsequent to the installation of each SSDS, sub-slab pressure will be monitored to verify that a negative pressure of at least 0.002 inches is achieved in the vapor monitoring points in each treatment area. Smoke tubes will be used to check for leaks through cracks or floor joints. Observable leaks will be sealed with Master Seal SL1 or NP1 caulk. Post-SSDS start-up, the indoor and outdoor air will be re-sampled during the 2023-2024 heating season to document the effectiveness of the SSDS as described below.

SSDS installation and post-installation testing will be summarized in an SSDS Installation and Testing Report. The report will include descriptions and as-built drawings of SSDS systems and components and a summary of testing results. An SSDS Mitigation System Installation

Record Form will be submitted to the Department for the newly installed and four current SSD Systems as part of the SSDS Installation and Testing Report.

4.0 MAINTENANCE AND MONITORING

System checks will be completed weekly for the first month of systems operation, monthly for the following two months, and on a quarterly basis thereafter. If determined necessary, site checks may be completed more frequently. Routine monitoring will include the identification and repair of any leaks, operational status checks of fans, documentation of vacuum at each vapor extraction point, and documentation of vacuum at each monitoring point. Non-routine maintenance, including carbon change-outs, will be completed as necessary.

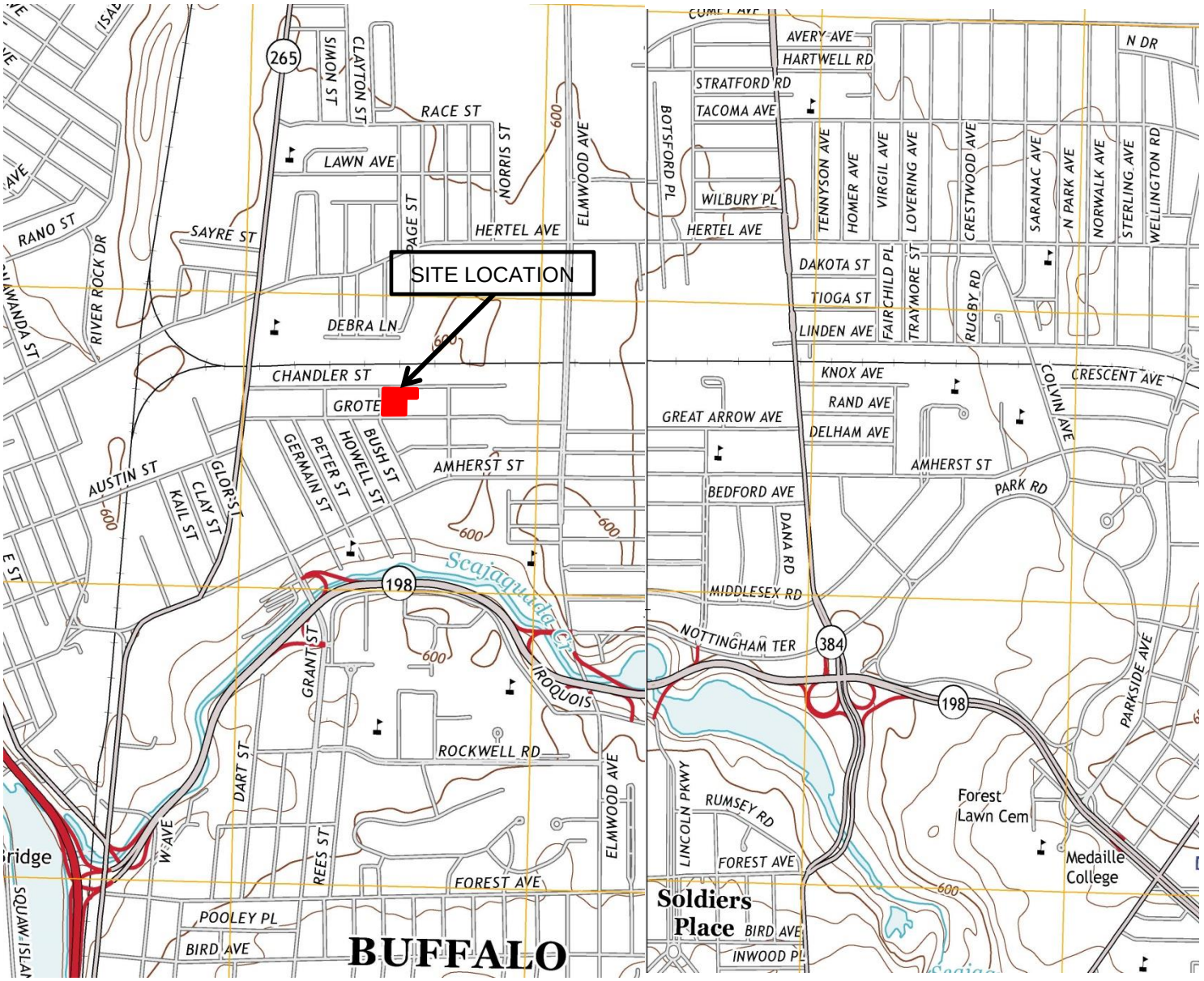
Post-installation inspection and testing will be conducted at roughly 30 days following SSDS installation and start-up. Actions will be taken to identify and modify any leaks associated with the system and piping. The following testing will be performed to ensure that the system is function properly:

- Confirm adequate operation of the system failure warning device;
- Visually inspect system and components, including the piping, fan, warning device, labels, etc. The system piping above ground within the areas of concern should be equipped with an access port to allow digital micro-manometer to be used to confirm vacuum pressure. Alternatively, a micro manometer can be installed into the piping. Identify and correct any leaking.
- Inspect exhaust points to verify no nearby air intakes are being impacted. For both areas of concern, calibrated Photo-Ionization Detector (PID) readings will be collected from the system effluent on a monthly basis.

During the 2023-2024 heating season indoor and outdoor air samples will be collected at each previously tested location within the building areas of concern as well as IA-5 and IA-13 at the request of the Department as indicated on Figure 7. Each indoor air sample will be collected in general accordance with the methodologies identified in the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated October 2006, and as described in the Department-approved April 2022 SVI Work Plan[8]. Each sample will be collected with a separate flow regulator and a lab-certified clean 1-liter summa canister. All sampling and purging flow rates must be below 0.2 liters per minute, and samples should be collected for a minimum of 8-hours. Each sample will be analyzed for volatile organic compounds via USEPA Method TO-15. A Data Usability Summary Report (DUSR) will be prepared for the post-SSD installation samples collected. Air sampling results will be reported to the Department in a SSDS Installation Confirmation Sampling Report.

[8] Soil Vapor Intrusion Investigation Work Plan for Pierce Arrow Business Center, 155-157 Chandler Street, Buffalo, NY 14203, NYSDEC Site Number: C915312, prepared by Environmental Advantage Inc., dated March 15, 2022.

FIGURES



THIS DRAWING IS FOR ILLUSTRATIVE AND INFORMATIONAL PURPOSES ONLY
AND WAS ADAPTED FROM USGS, BUFFALO NE & NW, NEW YORK 2013 QUADRANGLE.

*Figure used by Schenne & Associates Engineers & Geologists with permission from Environmental Advantage, Inc.

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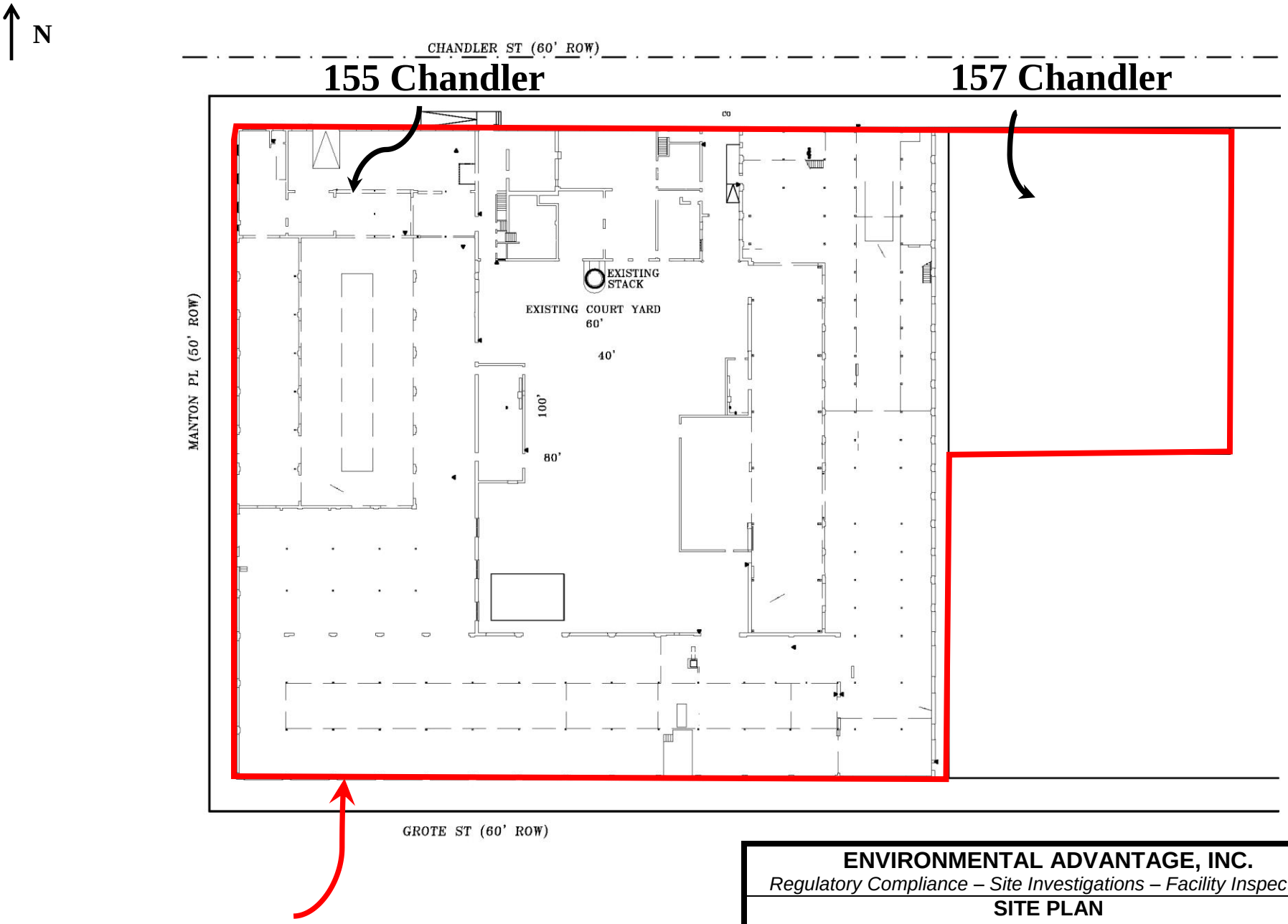
ENVIRONMENTAL ADVANTAGE, INC. *Regulatory Compliance – Site Investigations – Facility Inspections*		
LOCUS PLAN 155 and 157 CHANDLER STREET BUFFALO, NEW YORK		
R & M LEASING LLC BUFFALO, NEW YORK		
DRAWN BY: MB	SCALE: NOT TO SCALE	PROJECT: 01101
CHECKED BY: CMH	DATE: 01/2023	FIGURE NO: 1



ENVIRONMENTAL ADVANTAGE, INC.		
Regulatory Compliance – Site Investigations – Facility Inspections		
SITE PLAN 155 and 157 CHANDLER STREET BUFFALO, NEW YORK		
R & M LEASING LLC BUFFALO, NEW YORK		
DRAWN BY: MB	SCALE: NOT TO SCALE	PROJECT: 01101
CHECKED BY: CMH	DATE: 01/2023	FIGURE NO: 2

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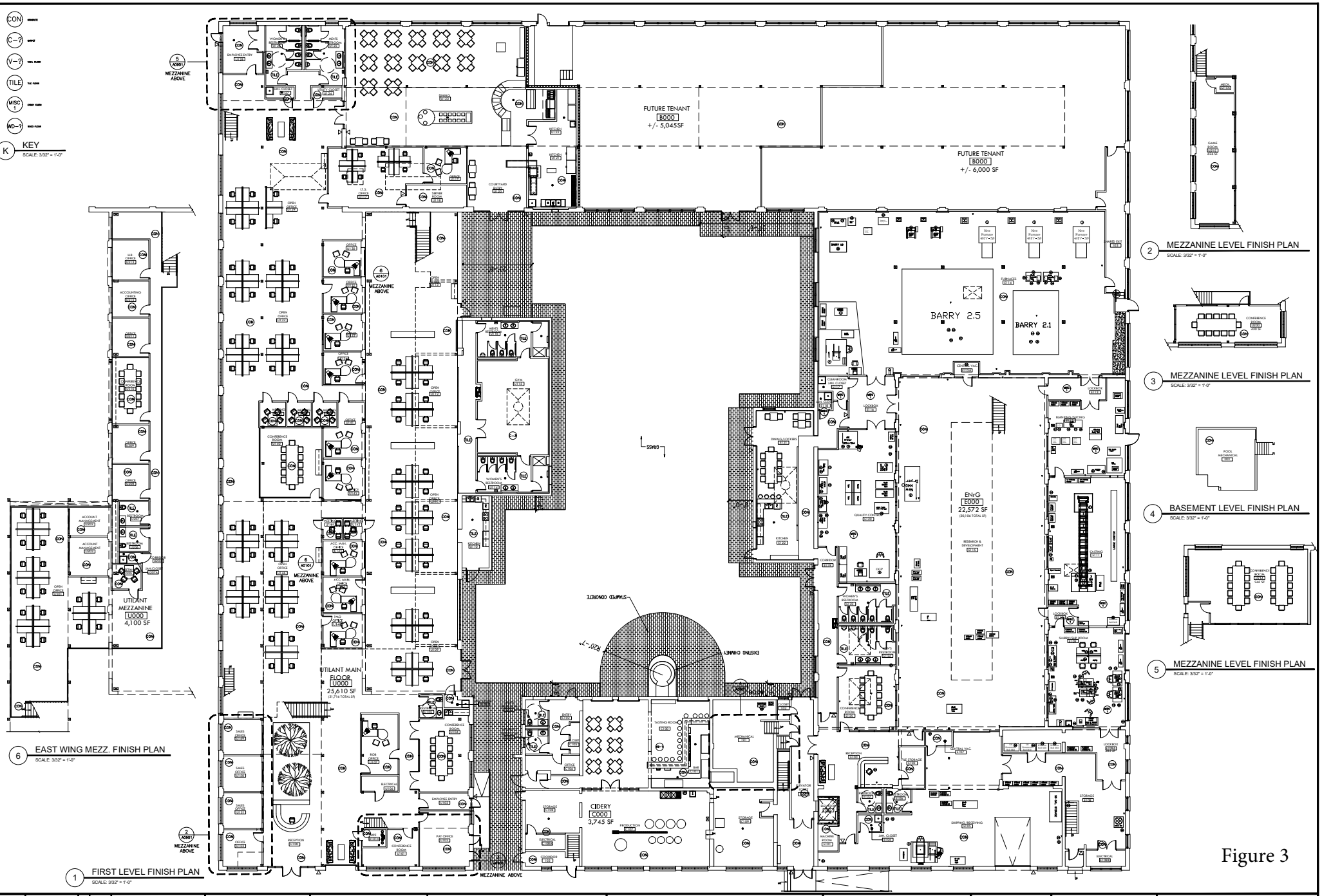

Figure 3

NO.	DATE	DESCRIPTION	NO.	DATE	DESCRIPTION

IT IS A VIOLATION OF SECTION 7209, SUBDIVISION 2, OF THE NEW YORK STATE EDUCATION LAW FOR ANY PERSON, UNLESS THEY HAVE BEEN AUTHORIZED BY THE ARCHITECT, ENGINEER, OR LAND SURVEYOR, TO ALTER ANY ITEM ON THIS PLAN IN ANY WAY. IF ANY ITEM BEARING THE SEAL OF AN ARCHITECT, ENGINEER, OR LAND SURVEYOR IS ALTERED, THE ALTERING ARCHITECT, ENGINEER, OR LAND SURVEYOR SHALL AFFIX TO THE PLAN IN THE VICINITY OF THE ALTERATION THE WORDS "ALTERED BY" FOLLOWED BY HIS SIGNATURE AND THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

STAMP

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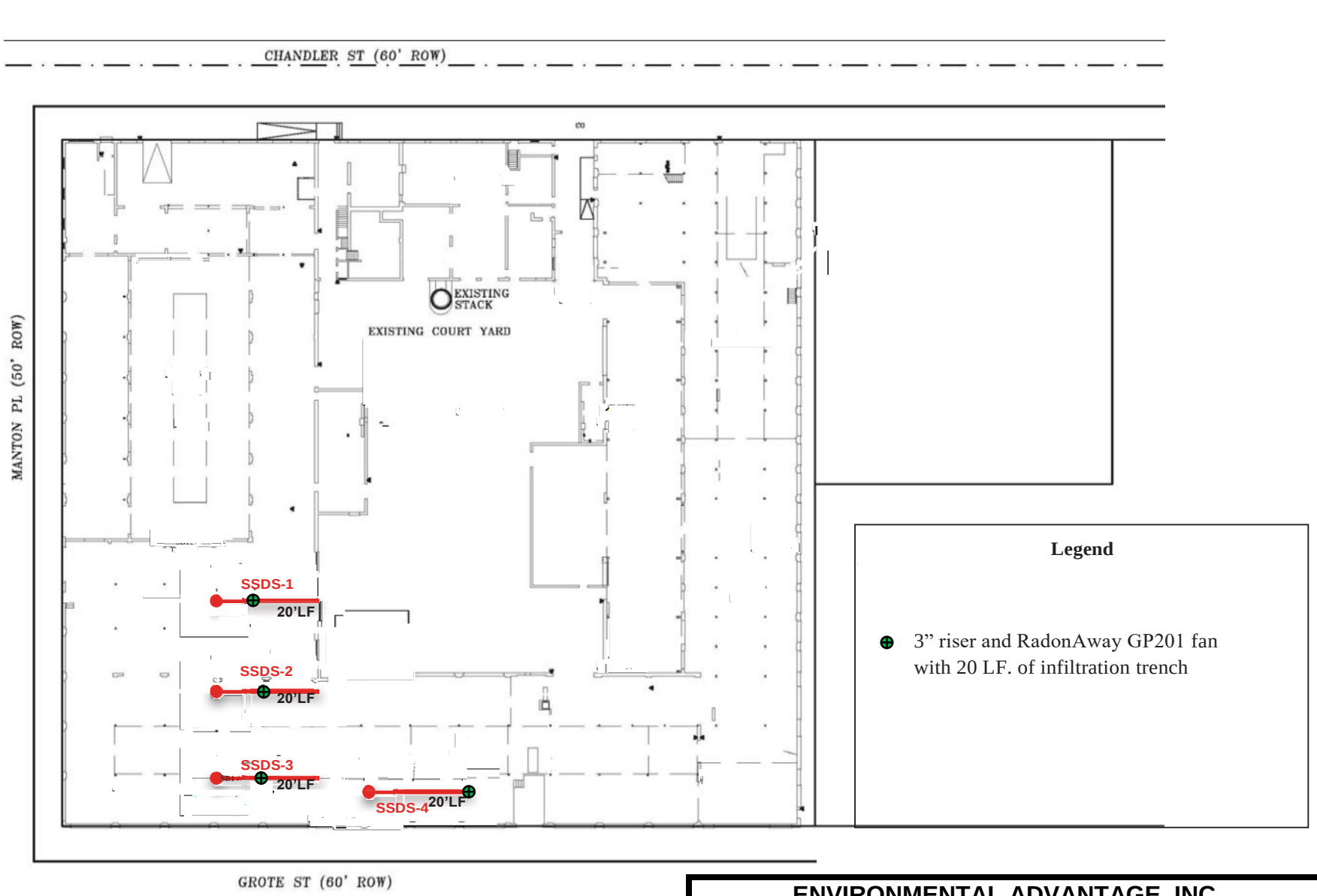
KEY PLAN

PROJECT
155 CHANDLER ST.
Buffalo, NY 14207

FIRST LEVEL INTERIOR FINISH PLAN

SCALE: AS NOTED | DATE: 9/26/2017 | DWG. A0901



SUB-SLAB MIGRATION SYSTEM

N.T.S.

AS-BUILT

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ENVIRONMENTAL ADVANTAGE, INC.		
Regulatory Compliance – Site Investigations – Facility Inspections		
SSDS Plan		
155 and 157 CHANDLER STREET		
BUFFALO, NEW YORK		
R & M LEASING LLC		
BUFFALO, NEW YORK		
DRAWN BY: MB	SCALE: NOT TO SCALE	PROJECT: 01101
CHECKED BY: CMH	DATE: 01/2023	FIGURE NO: 4

N

View of Rooftop above Cider Hall

RT-1

OA-1 (03/29/22)

IA-15 (07/28/22)

SS-9/IA-9 (03/29/22)

IA-16 (07/28/22)

SS-7/IA-7 (03/29/22)

SS-12/IA-12 (06/14/22)

CIDERY BAR AREA

ODL RECEPTION AREA

SS-13/IA-13 (06/14/22)

UPPER: MEZZANINE
LOWER: ODL BASEMENT
STORAGE ROOM

ELEVATOR

IA-14 (06/14/22)

STORAGE CLOSET

CIDERY ADDITIONAL SEATING AREA

CIDERY SEATING / EVENT AREA

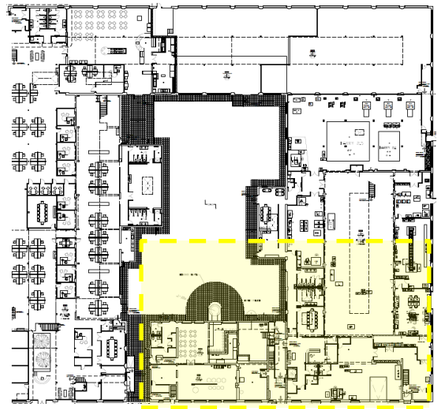
SS-11/IA-11 (06/14/22)

SS-8/IA-8 (06/14/22)

OA-2 (06/14/22)

SS-10/IA-10(03/29/22)

Chandler Street



Legend

- Indoor Air Sample Location
- Sub-slab Air Sample Location
- Mezzanine Air Sample Location
- Rooftop Outdoor Air Sample Location
- Outdoor Air Sample Location
- Basement boundary area below mezzanine
- Sample ID
- Basement Closed Off Area
- Area of Concern

ENVIRONMENTAL ADVANTAGE, INC.
Regulatory Compliance - Site Investigations - Facility Audits

AREAS OF CONCERN

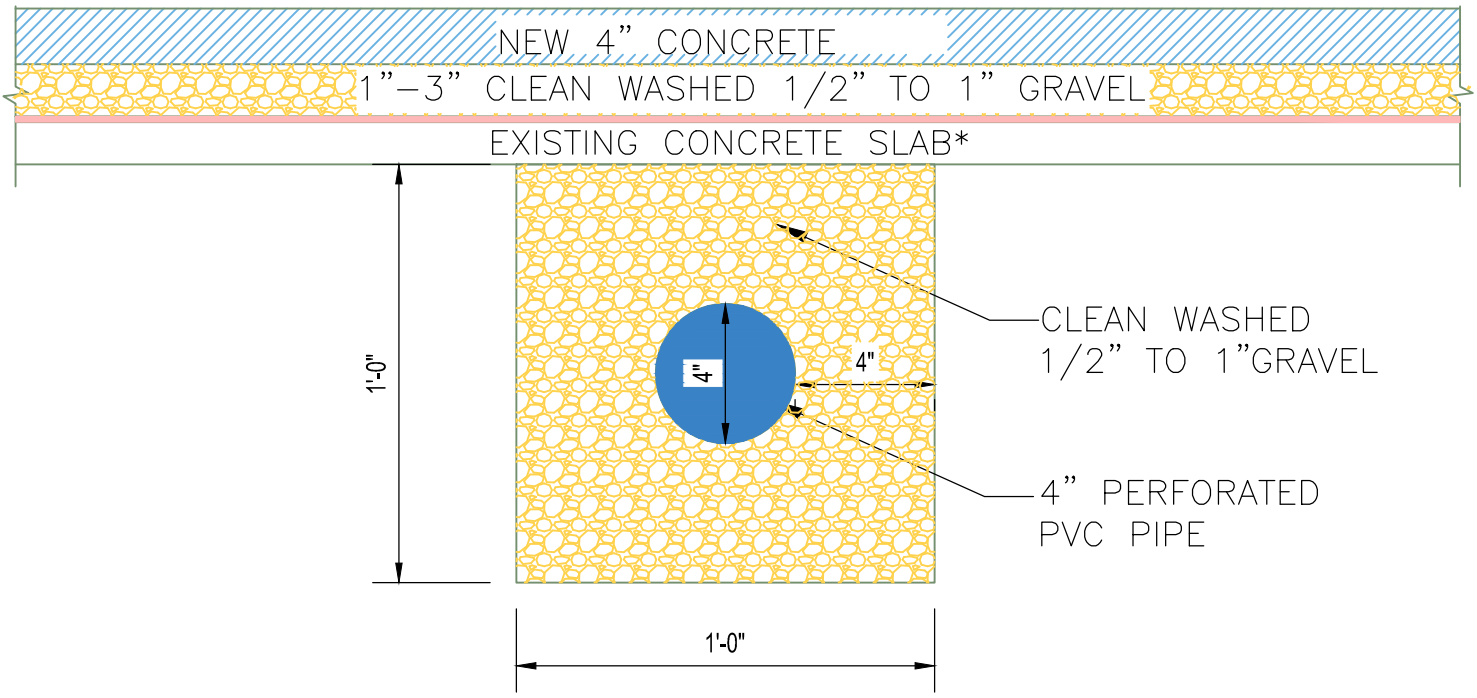
155 and 157 CHANDLER STREET
BUFFALO, NEW YORK

R & M LEASING LLC
BUFFALO, NEW YORK

DRAWN BY: MB CHECKED BY: CMH	SCALE: NOT TO SCALE DATE: 01/2023	FIGURE 5

*Figure Adapted From: "Alterations To: 155 Chandler Street, Construction Set", dated September 26, 2017

**Figure used by Schenne & Associates Engineers & Geologists with permission from Environmental Advantage, Inc.

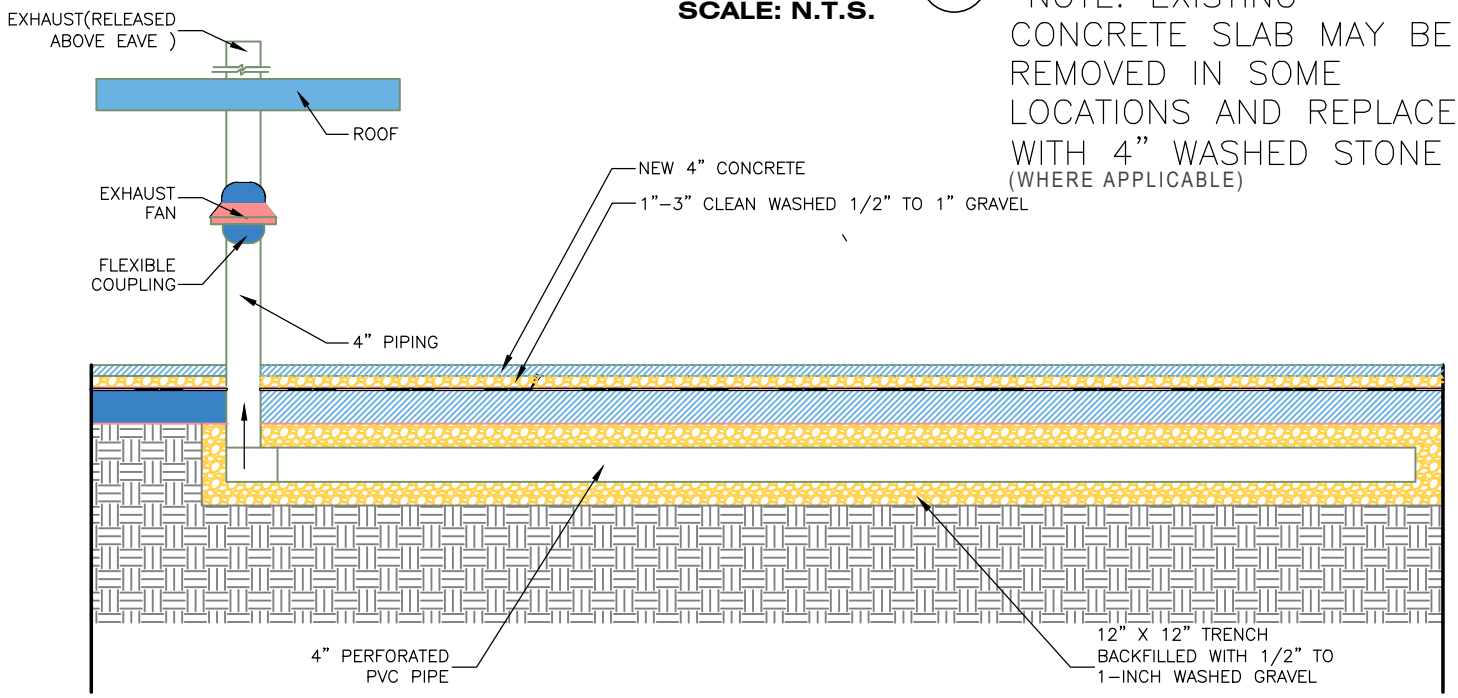


TYPICAL CROSS-SECTION OF SSDS TRENCH AND PIPING

1 / SK-1

SCALE: N.T.S.

*NOTE: EXISTING CONCRETE SLAB MAY BE REMOVED IN SOME LOCATIONS AND REPLACED WITH 4" WASHED STONE (WHERE APPLICABLE)



TYPICAL SSDS TRENCH PROFILE

2 / SK-1

SCALE: N.T.S.

SCHENNE & ASSOCIATES
CONSULTING ENGINEERS
391 Washington Street Suite 800
Buffalo, NY 14203
(716) 655-4991 JOHN@SCHENNE.COM

OWNER
166 CHANDLER HOLDINGS LLC
391 WASHINGTON ST,
SUITE 800
BUFFALO NY

PROJECT
PIERCE ARROW BUSINESS PARK
155 CHANDLER ST
BUFFALO NY

JOB:17-1725 DRAWN BY WX

FIGURE 6
SUB-SLAB MITIGATION DESIGN

DWG. SK-7

SCALE: AS NOTED

DATE: 12/05/2017

N

IA-9

IA-7

IA-12

IA-5

IA-13

CIDERY BAR AREA

ODL RECEPTION AREA

UPPER: MEZZANINE
LOWER: ODL BASEMENT
STORAGE ROOM

ELEVATOR

CIDERY
SEATING /
EVENT
AREA

STORAGE CLOSET

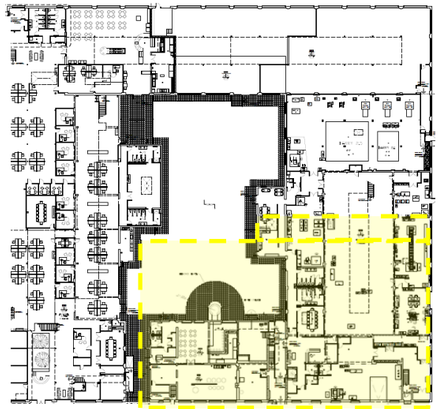
CIDERY ADDITIONAL SEATING AREA

IA-8

OA-2

IA-10 & IA-11

Chandler Street



Legend

- Proposed Indoor Air Sample Location
- Proposed Outdoor Air Sample Location
- Basement boundary area below mezzanine
- Previous Sample ID
- Basement Closed Off Area
- Area of Concern

ENVIRONMENTAL ADVANTAGE, INC.
Regulatory Compliance - Site Investigations - Facility Audits

POST SSDS INSTALLATION SAMPLING LOCATIONS

155 and 157 CHANDLER STREET
BUFFALO, NEW YORK

R & M LEASING LLC
BUFFALO, NEW YORK

DRAWN BY: MB CHECKED BY: CMH	SCALE: NOT TO SCALE DATE: 03/2023	FIGURE 7

*Figure Adapted From: "Alterations To: 155 Chandler Street, Construction Set", dated September 26, 2017

**Figure used by Schenne & Associates Engineers & Geologists with permission from Environmental Advantage, Inc.

TABLES

Table 1
2022 Soil Vapor Intrusion Investigation Decision Matrices
155 Chandler Street, Buffalo, NY

Sample ID	Parameter	Sub-slab Vapor Concentrations (ug/m^3)	Indoor Air Concentration (ug/m^3)	Recommended Action
Matrix A Trichloroethene (TCE); cis-1,2-dichloroethene (cis-DCE); 1,1-dichloroethene (1,1-DCE); Carbon Tetrachloride				
SS-7/IA-7 (032922)	TCE	8.92	24.1	Mitigate
	cis-DCE	ND	0.369	No further action
	1,1-DCE	ND	ND	No further action
	Carbon Tetrachloride	3.12	3.96	Identify Source(s) and Resample or Mitigate
SS-9/IA-9 (032922)	TCE	7.09	25.5	Mitigate
	cis-DCE	ND	0.389	No further action
	1,1-DCE	ND	ND	No further action
	Carbon Tetrachloride	8.87	8.05	Mitigate
SS-10/IA-10 (032922)	TCE	23.4	39.2	Mitigate
	cis-DCE	ND	0.48	No further action
	1,1-DCE	ND	ND	No further action
	Carbon Tetrachloride	4.3	5.13	Identify Source(s) and Resample or Mitigate
SS-8/IA-8 (061422)	TCE	ND	ND	No further action
	cis-DCE	ND	ND	No further action
	1,1-DCE	ND	ND	No further action
	Carbon Tetrachloride	5.64	0.453	No further action
SS-11/IA-11 (061422)	TCE	485	ND	Possible action needed**
	cis-DCE	1.33	ND	No further action
	1,1-DCE	ND	ND	No further action
	Carbon Tetrachloride	2.47	0.371	No further action
SS-12/IA-12 (061422)	TCE	5800	0.989	Mitigate
	cis-DCE	ND	ND	No further action
	1,1-DCE	ND	ND	No further action
	Carbon Tetrachloride	45700	0.459	Mitigate
SS-13/IA-13 (061422)	TCE	16.2 J	0.247	Monitor
	cis-DCE	ND	ND	No further action
	1,1-DCE	ND	ND	No further action
	Carbon Tetrachloride	ND	0.447	No further action
Matrix B Methylene Chloride (MC); 1,1,1- Trichloroethane (1,1,1-TCA); Tetrachloroethylene (PCE)				
SS-7/IA-7 (032922)	MC	ND	ND	No further action
	1,1,1-TCA	ND	ND	No further action
	PCE	ND	0.373	No further action
SS-9/IA-9 (032922)	MC	1.99	ND	No further action
	1,1,1-TCA	ND	ND	No further action
	PCE	1.45	0.610	No further action
SS-10/IA-10 (032922)	MC	ND	ND	No further action
	1,1,1-TCA	ND	ND	No further action
	PCE	ND	0.305	No further action
SS-8/IA-8 (061422)	MC	ND	ND	No further action
	1,1,1-TCA	ND	ND	No further action
	PCE	355	55.9	Mitigate
SS-11/IA-11 (061422)	MC	ND	ND	No further action
	1,1,1-TCA	ND	ND	No further action
	PCE	ND	147	Possible action needed***
SS-12/IA-12 (061422)	MC	ND	2.34	No further action
	1,1,1-TCA	ND	ND	No further action
	PCE	ND	34.6	Possible action needed***
SS-13/IA-13 (061422)	MC	ND	ND	No further action
	1,1,1-TCA	ND	ND	No further action
	PCE	ND	0.149	No further action
Matrix C Vinyl Chloride (VC)				
SS-7/IA-7 (032922)	VC	ND	ND	No further action
SS-9/IA-9 (032922)	VC	ND	ND	No further action
SS-10/IA-10 (032922)	VC	ND	ND	No further action
SS-8/IA-8 (061422)	VC	ND	ND	No further action
SS-11/IA-11 (061422)	VC	ND	ND	No further action
SS-12/IA-12 (061422)	VC	ND	ND	No further action
SS-13/IA-13 (061422)	VC	ND	ND	No further action

1. Table used by Schenne & Associates Engineers & Geologists with permission from Environmental Advantage, Inc.
2. Compounds included on NYSDOH Air Matricies included in this table. For a list of all compounds, refer to analytical reports.
3. Analytical testing for VOCs via TO-15 completed by Alpha Analytical.
4. Results present in ug/m^3 or microgram per cubic meter.
5. Samples were collected during an 8-hour sample duration.
6. Air Guidance Values from Table 3.1 Air guideline values derived by the NYSDOH included in the "Guidance for Evaluating Soil Vapor Intrusion in the State of New York" dated October 2006, prepared by New York State Department of Health and updated in May 2017.
7. Yellow shaed values represent continued Monitoring recommended; green shaded values represent Resampling to identify source Mitigation recommended; orange shaded values represent Mitigation recommended; blue shaded values represent possible action needed.
8. ND = Non Detect
9. ** = Due to elevated sub-slab concentrations for TCE in SS-11(061422), mitigation may be needed if a detectable indoor concentration is recorded in the future.
10. *** = Although sub-slab concentrations for PCE are non-detect in SS-11(061422) and SS-12(061422), identification of source(s) and resample or mitigate may be needed if a detectable sub-slab concentration is recorded in the future. Indoor air concentrations exceed the NYSDOH AGV for PCE.

Environmental Advantage

APPENDIX A

RadonAway
The world's leading radon fan manufacturer

RP PRO SERIES

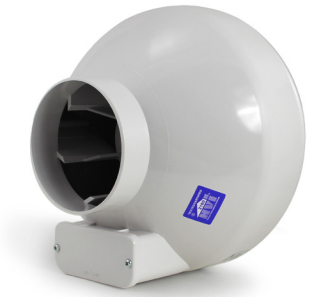
Installs white, stays white

Radon Mitigation Fan

All RadonAway® fans are specifically designed for radon mitigation. RP Series Fans provide superb performance, run ultra-quiet and are attractive. They are ideal for most sub-slab radon mitigation systems.

Features

- Eternalast™ polycarbonate plastic housing
- Energy efficient
- Ultra-quiet operation
- Meets all electrical code requirements
- Water-hardened motorized impeller
- Seams sealed to inhibit radon leakage (RP140 & RP145 double snap sealed)
- ETL Listed - for indoor or outdoor use
- Thermally protected motor
- Rated for commercial and residential use
- HVI certified fan performance



Model	A	B	C
RP140	4.5"	9.7"	8.5"
RP145	4.5"	9.7"	8.5"
RP260	6"	11.75"	8.6"
RP265	6"	11.75"	8.6"
RP380	8"	13.41"	10.53"

MODEL	P/N	FAN DUCT DIAMETER	WATTS	RECOM. MAX. OP. PRESSURE "WC	TYPICAL CFM vs. STATIC PRESSURE WC					
					0"	.2"	.5"	1.0"	1.5"	2.0"
RP140†	28460	4"	14-19	0.6	152	120*	64*	-	-	-
RP145	28461	4"	34-66	1.7	169	150*	124*	81*	42	4
RP260	28462	6"	47-65	1.3	251	210*	157	70	-	-
RP265	28463	6"	96-136	2.3	375	340*	282*	204*	140	70
RP380	28464	8"	96-138	2.0	531	490*	415*	268*	139	41

*HVI Certified Values. †Energy Star® Rated.

MADE IN USA

ETL Listed
Intertek

5 YEAR WARRANTY
All RadonAway® inline radon fans are covered by our 5-year, hassle-free warranty.

ENERGY STAR
RP140 Only

For Further Information, Contact Your Radon Professional:

Rev G 0322
P/N 02047

RP, GP, XP Pro Series Installation Instructions

DO NOT CONNECT POWER SUPPLY UNTIL FAN IS COMPLETELY INSTALLED. MAKE SURE ELECTRICAL SERVICE TO FAN IS LOCKED IN "OFF" POSITION. DISCONNECT POWER BEFORE SERVICING FAN.

1. **WARNING!** For General Ventilating Use Only. Do Not Use to Exhaust Hazardous, Corrosive or Explosive Materials, Gases or Vapors. See Vapor Intrusion Application Note #AN001 for important information on VI Applications. RadonAway.com/vapor-intrusion

2. **NOTE:** Fan is suitable for use with solid state speed controls; however, use of speed controls is not generally recommended.

3. **WARNING!** Check voltage at the fan to ensure it corresponds with nameplate.

4. **WARNING!** Normal operation of this device may affect the combustion airflow needed for safe operation of fuel burning equipment. Check for possible backdraft conditions on all combustion devices after installation.

5. **NOTICE!** There are no user serviceable parts located inside the fan unit.
   Do NOT attempt to open. Return unit to the factory. (See Warranty, p. 8, for details.)

6. **WARNING!** Do not leave fan unit installed on system piping without electrical power for more than 48 hours. Fan failure could result from this non-operational storage.

7. **WARNING!** TO REDUCE THE RISK OF FIRE, ELECTRIC SHOCK, OR INJURY TO PERSONS, OBSERVE THE FOLLOWING:

   a) Use this unit only in the manner intended by the manufacturer. If you have questions, contact the manufacturer. (See p. 8.)

   b) Before servicing or cleaning unit, switch power off at service panel and lock the service disconnecting means to prevent power from being switched on accidentally. When the service disconnecting means cannot be locked, securely fasten a prominent warning device, such as a tag, to the service panel.

   c) Installation work and electrical wiring must be done by qualified person(s) in accordance with all applicable codes and standards, including fire rated construction.

   d) Sufficient air is needed for proper combustion and exhausting of gases through the flue (chimney) of fuel burning equipment to prevent backdrafting. Follow the heating equipment manufacturers' guidelines and safety standards such as those published by any National Fire Protection Association, and the American Society for Heating, Refrigerating and Air Conditioning Engineers (ASHRAE), and the local code authorities.

   e) When cutting or drilling into a wall or ceiling, do not damage electrical wiring and other hidden utilities.

   f) Ducted fans must always be vented to outdoors.

   g) If this unit is to be installed over a tub or shower, it must be marked as appropriate for the application and be connected to a GFCI (Ground Fault Circuit Interrupter) protected branch circuit.

1.0 SYSTEM DESIGN CONSIDERATIONS

1.1 INTRODUCTION

The RP, GP and XP Pro Series Radon Fans are intended for use by trained, professional, certified/licensed radon mitigators. The purpose of these instructions is to provide additional guidance for the most effective use of RP, GP and XP Series Fans. These instructions should be considered supplemental to EPA/radon industry standard practices, state and local building codes and regulations. In the event of a conflict, those codes, practices and regulations take precedence over these instructions.

1.2 FAN SEALING

The RP, GP and XP Pro Series Radon Fans are factory sealed; no additional caulk or other materials are required to inhibit air leakage.

1.3 ENVIRONMENTALS

The RP, GP and XP Pro Series Radon Fans are designed to perform year-round in all but the harshest climates without additional concern for temperature or weather. For installations in an area of severe cold weather, please contact RadonAway for assistance. When not in operation, the fan should be stored in an area where the temperature is never less than 32 degrees F or more than 100 degrees F.

1.4 ACOUSTICS

The RP, GP and XP Pro Series Radon Fans, when installed properly, operate with little or no noticeable noise to the building occupants. The velocity of the outgoing air should be considered in the overall system design. In some cases the “rushing” sound of the outlet air may be disturbing. In these instances, the use of a RadonAway Exhaust Muffler is recommended.

(To ensure quiet operation of inline and remote fans, each fan shall be installed using sound attenuation techniques appropriate for the installation. For bathroom and general ventilation applications, at least 8 feet of insulated flexible duct shall be installed between the exhaust or supply grille(s) and the fan(s). The RP, GP and XP Pro Series Radon Fans are not suitable for kitchen range hood remote ventilation applications.)

1.5 GROUND WATER

In the event that a temporary high water table results in water at or above slab level, water may be drawn into the riser pipes, thus blocking air flow to the RP, GP and XP Pro Series Radon Fan. The lack of cooling air may result in the fan cycling on and off as the internal temperature rises above the thermal cutoff. Should this condition arise, it is recommended that the fan be turned off until the water recedes, allowing for return to normal operation.

1.6 SLAB COVERAGE

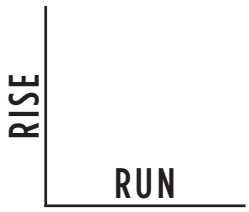
The RP, GP and XP Pro Series Radon Fans can provide coverage up to 2000+ sq. ft. per slab penetration. This will primarily depend on the sub-slab material in any particular installation. In general, the tighter the material, the smaller the area covered per penetration. Appropriate selection of the RP, GP and XP Pro Series Radon Fan best suited for the sub-slab material can improve the slab coverage. The RP, GP and XP Pro Series Radon Fans have a wide range of models to choose from to cover a wide range of sub-slab materials. The RP140 and 145 are best suited for general purpose use. The RP260 can be used where additional airflow is required, and the RP265 and RP380 are best suited for large slab, high airflow applications. Additional suction points can be added as required. It is recommended that a small pit (5 to 10 gallons in size) be created below the slab at each suction hole.

1.7 CONDENSATION & DRAINAGE

Condensation is formed in the piping of a mitigation system when the air in the piping is chilled below its dew point. This can occur at points where the system piping goes through unheated space such as an attic, garage or outside. The system design must provide a means for water to drain back to a slab hole to remove the condensation. The RP, GP and XP Pro Series Radon Fan MUST be mounted vertically plumb and level, with the outlet pointing up for proper drainage through the fan. Avoid mounting the fan in any orientation that will allow water to accumulate inside the fan housing. The RP, GP and XP Pro Series Radon Fans are NOT suitable for underground burial.

For RP, GP and XP Pro Series Fan piping, the following table provides the minimum recommended pipe diameter and pitch under several system conditions.

Pipe Diameter	Minimum Rise per Ft of Run*		
	@25 CFM	@50 CFM	@100 CFM
4”	1/8”	1/4”	3/8”
3”	1/4”	3/8”	1 1/2”



*See p. 7 for detailed specifications.

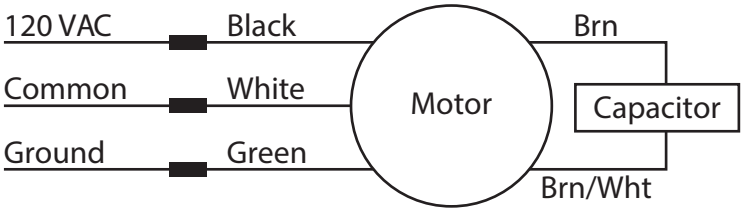
1.8 SYSTEM MONITOR & LABEL

A System Monitor, such as a manometer (P/N 50017) or audible alarm (P/N 28535, 28001-2, 28001-4 or 28421), is required to notify the occupants of a fan system malfunction. A System Label (provided with Manometer P/N 50017) with instructions for contacting the installing contractor for service and identifying the necessity for regular radon tests to be conducted by the building occupants must be conspicuously placed in a location where the occupants frequent and can see the label.

1.9 ELECTRICAL WIRING

The RP, GP and XP Pro Series Radon Fans operate on standard 120V, 60Hz AC. All wiring must be performed in accordance with National Fire Protection (NFPA) National Electrical Code, Standard #70, current edition, for all commercial and industrial work, and state and local building codes. All wiring must be performed by a qualified and licensed electrician. Outdoor installations require the use of a UL Listed watertight conduit. Ensure that all exterior electrical boxes are outdoor rated and properly sealed to prevent water penetration into the box. A means, such as a weep hole, is recommended to drain the box.

The RP, GP and XP Pro Series Radon Fan Wiring Diagram



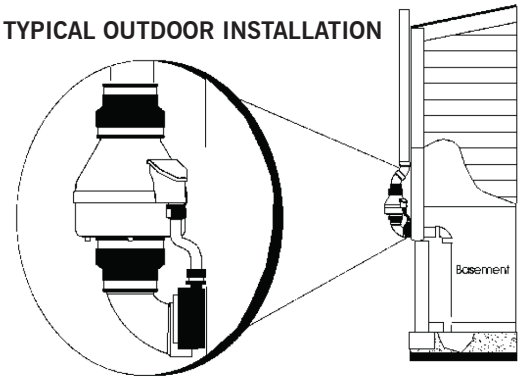
1.10 SPEED CONTROLS

The RP, GP and XP Pro Series Radon Fans are rated for use with electronic speed controls; however, speed controls are generally not recommended. If used, the recommended speed control is Pass & Seymour Solid State Speed Control (Cat. No. 94601-1).

2.0 INSTALLATION

The RP, GP and XP Pro Series Radon Fans can be mounted indoors or outdoors. (It is suggested that EPA and radon mitigation standards recommendations be followed in choosing the fan location.) The GP fans have an integrated mounting bracket; the RP, GP and XP Pro Series Radon Fans may be mounted directly on the system piping or fastened to a supporting structure by means of an optional mounting bracket. The ducting from the fan to the outside of the building has a strong effect on noise and fan energy use. Use the shortest, straightest duct routing possible for best performance, and avoid installing the fan with smaller ducts than recommended. Insulation around the ducts can reduce energy loss and inhibit mold growth. Fans installed with existing ducts may not achieve their rated airflow.

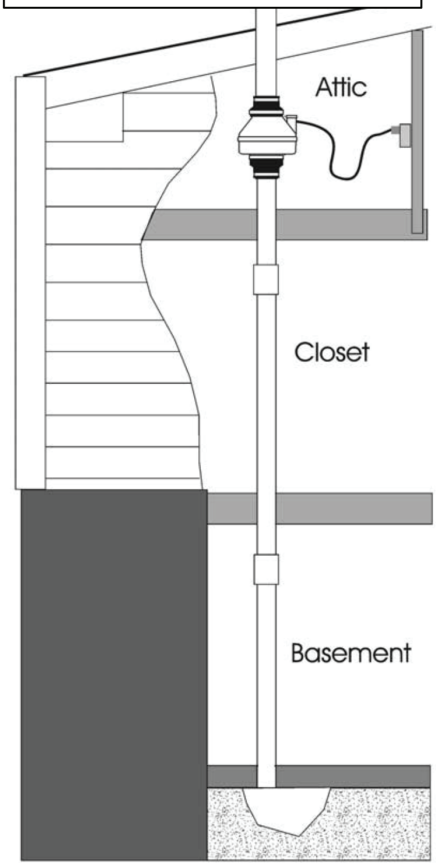
TYPICAL OUTDOOR INSTALLATION



2.1 MOUNTING

Mount the RP, GP and XP Pro Series Radon Fan vertically with outlet up. Ensure the unit is plumb and level. When mounting directly on the system piping assure that the fan does not contact any building surface to avoid vibration noise.

TYPICAL INDOOR INSTALLATION



2.2 MOUNTING BRACKET (optional)

The RP, GP and XP Pro Series Radon Fans may be optionally secured with the RadonAway Fan Mounting Bracket (P/N 25007). Foam or rubber grommets may also be used between the bracket and mounting surface for vibration isolation.

2.3 SYSTEM PIPING

Complete piping run, using flexible couplings as a means of disconnect for servicing the unit and for vibration isolation. As the fan is typically outside of the building thermal boundary and is venting to the outside, installation of insulation around the fan is not required.

2.4 ELECTRICAL CONNECTION

Connect wiring with wire nuts provided, observing proper connections (See Section 1.9). Note that the fan is not intended for connection to rigid metal conduit.

2.5 VENT MUFFLER (optional)

Install the muffler assembly in the selected location in the outlet ducting. Solvent weld all connections. The muffler is normally installed at the end of the vent pipe.

2.6 OPERATION CHECKS & ANNUAL SYSTEM MAINTENANCE

_____ **Verify** all connections are tight and **leak-free**.

_____ **Ensure** the RP, GP and XP Pro Series Radon Fan and all ducting are **secure and vibration-free**.

_____ **Verify system vacuum pressure** with manometer. **Ensure** vacuum pressure is within normal operating range and **less than** the maximum recommended operating pressure.

(Based on sea-level operation, at higher altitudes reduce by about 4% per 1000 feet)
(Further reduce Maximum Operating Pressure by 10% for High Temperature environments.)
See Product Specifications. If this is exceeded, increase the number of suction points.

_____ **Verify Radon levels** by testing to EPA Protocol and applicable testing standards.

THE FOLLOWING CHARTS SHOW THE PERFORMANCE OF THE RP, GP AND XP PRO SERIES RADON FANS

RP Pro Series Product Specifications

Typical CFM Vs. Static Pressure "WC									
Model	**0"**	**.2"**	**.5"**	**.75"**	**1.0"**	**1.25"**	**1.5"**	**1.75"**	**2.0"**
RP140	152	120*	64*	-	-	-	-	-	
RP145	169	150*	124*	101	81*	61	42	22	4
RP260	251	210*	157	117	70	26	-	-	-
RP265	375	340*	282*	238	204*	170	140	108	70
RP380	531	490*	415*	340	268*	200	139	84	41

**Denotes HVI certified values.*

Model	Power Consumption 120VAC, 60Hz, 1.5 Amp Maximum	Maximum Recommended Operation Pressure* (Sea Level Operation)**
RP140	14 - 19 watts	0.6" WC
RP145	34 - 66 watts	1.7" WC
RP260	47-65 watts	1.3" WC
RP265	96 - 136 watts	2.3" WC
RP380	96 - 138 watts	2.0" WC

**Reduce by 10% for High Temperature Operation. **Reduce by 4% per 1000 ft. of altitude.*

Model	Size	Weight	Inlet/Outlet	L.2
RP140	8.5"H x 9.7" Dia.	5.5 lbs	4.5"OD (4.0" PVC Sched 40 size compatible)	25
RP145	8.5"H x 9.7" Dia.	5.5 lbs	4,5" OD	15
RP260	8.6"H x 11.75" Dia.	5.5 lbs	6.0" OD	48
RP265	8.6"H x 11.75" Dia.	6.5 lbs	6.0" OD	30
RP380	10.53"H x 13.41" Dia.	11.5 lbs	8.0" OD	57

L.2 = Estimated Equivalent Length of Rigid Metal Ducting resulting in .2" WC pressure loss for Duct Size listed. Longer Equivalent Lengths can be accommodated at Flows Lower than that at .2" WC pressure loss (see CFM Vs Static Pressure "WC Table).

XP Pro Series Product Specifications

Typical CFM Vs. Static Pressure "WC						
	0"	**.5"**	**1.0"**	**1.5"**	**1.75"**	**2.0"**
XP151	167	127	77	-	-	-
XP201	126	98	66	26	-	-

Model	Power Consumption 120VAC, 60Hz, 1.5 Amp Maximum	Maximum Recommended Operation Pressure* (Sea Level Operation)**
XP151	53-70 watts	1.4" WC
XP201	38-74 watts	1.6" WC

**Reduce by 10% for High Temperature Operation **Reduce by 4% per 1000 ft. of altitude.*

Model	Size	Weight	Inlet/Outlet
XP151	9.5"H x 8.5" Dia.	6 lbs	4.5"OD (4.0" PVC Sched 40 size compatible)
XP201	9.5"H x 8.5" Dia.	6 lbs	4.5" OD

GP Pro Series Product Specifications

Typical CFM Vs. Static Pressure "WC							
	1.0"	**1.5"**	**2.0"**	**2.5"**	**3.0"**	**3.5"**	**4.0"**
GP201	54	42	11	-	-	-	-
GP301	64	54	41	4	-	-	-
GP401	-	61	52	44	22	-	-
GP501	-	-	66	58	50	27	4

Model	Power Consumption 120VAC, 60Hz, 1.5 Amp Maximum	Maximum Recommended Operation Pressure* (Sea Level Operation)**
GP201	31-67 watts	1.8" WC
GP301	56-100 watts	2.3" WC
GP401	62-128 watts	3.0" WC
GP501	68 - 146 watts	3.8" WC

**Reduce by 10% for High Temperature Operation **Reduce by 4% per 1000 ft. of altitude.*

Model	Size	Weight	Inlet/Outlet
GP201	13"H x 12.5" Dia.	12 lbs	3.5"OD (3.0" PVC Sched 40 size compatible)
GP301	13"H x 12.5" Dia.	12 lbs	3.5" OD
GP401	13"H x 12.5" Dia.	12 lbs	3.5" OD
GP501	13"H x 12.5" Dia.	12 lbs	3.5" OD

RP, XP and GP Pro Series Additional Specifications

Model	Recommended Duct	PVC Pipe Mounting	Thermal Cutout	Insulation Class
RP140	3" or 4" Schedule 20/40 PVC	Mount on the duct pipe or with optional mounting bracket. For Ventilation: 4", 6" or 8" Rigid or Flexible Ducting.	130°C/266°F	Class B Insulation
RP145			130°C/266°F	Class F Insulation
RP260			150°C/302°F	
RP265			150°C/302°F	
RP380	6" Schedule 20/40 PVC Pipe		150°C/302°F	
XP151	3" or 4" Schedule 20/40 PVC	Fan may be mounted on the duct pipe or with integral flanges.	120°C/248°F	Class B Insulation
XP201				
GP201	3" or 4" Schedule 20/40 PVC	Fan may be mounted on the duct pipe or with integral flanges.	120°C/248°F	Class B Insulation
GP301				
GP401				
GP501				

Continuous Duty
3000 RPM
Thermally Protected
RP, GP Residential and Commercial
XP Residential Only
Rated for Indoor or Outdoor Use

ENERGY STAR
RP140 Only

LISTED
Electric Fan

Intertek
77728

Conforms to UL STD. 507
Certified to CAN/CSA STD. C22.2 No.113

IMPORTANT INSTRUCTIONS TO INSTALLER

Inspect the RP, GP and XP Pro Series Radon Fan for shipping damage within 15 days of receipt. **Notify RadonAway of any damages immediately.** RadonAway is not responsible for damages incurred during shipping. However, for your benefit, RadonAway does insure shipments.

There are no user serviceable parts inside the fan. **Do not attempt to open the housing.** Return unit to factory. (See Warranty below).

Install the RP, GP and XP Pro Series Radon Fan in accordance with all EPA, ANSI/AARST standard practices, and state and local building codes and regulations.

Provide a copy of this instruction or comparable radon system and testing information to the building occupants after completing system installation.

Warranty

RadonAway® warrants that the RP, GP (excluding GP500) and XP Pro Series Radon Fan (the "Fan") will be free from defects in materials and workmanship for a period of 12 months from the date of purchase or 18 months from the date of manufacture, whichever is sooner (the "Warranty Term").

RadonAway® will replace any fan which fails due to defects in materials or workmanship during the Warranty Term. This Warranty is contingent on installation of the Fan in accordance with the instructions provided. This Warranty does not apply where any repairs or alterations have been made or attempted by others, or if the unit has been abused or misused. Warranty does not cover damage in shipment unless the damage is due to the negligence of RadonAway®.

The Fan must be returned (at Owner's cost) to the RadonAway® factory. Any Fan returned to the factory will be discarded unless the Owner provides specific instructions along with the Fan when it is returned regardless of whether or not the Fan is actually replaced under this warranty. Proof of purchase must be supplied upon request for service under this Warranty.

5-YEAR EXTENDED WARRANTY WITH PROFESSIONAL INSTALLATION.

RadonAway® will extend the Warranty Term of the fan to 60 months (5 years) from date of purchase or 66 months from date of manufacture, whichever is sooner, provided that the fan is installed by a professional radon mitigation contractor. Proof of purchase and/or proof of professional installation may be required for service under this warranty. No extended warranty is offered outside the Continental United States and Canada beyond the standard 12 months from the date of purchase or18 months from the date of manufacture, whichever is sooner.

RadonAway® is not responsible for installation, removal or delivery costs associated with this Warranty.

LIMITATION OF WARRANTY

EXCEPT AS STATED ABOVE, THE RP, GP (excluding GP500) and XP PRO SERIES RADON FANS ARE PROVIDED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

IN NO EVENT SHALL RADONAWAY BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR RELATING TO, THE FAN OR THE PERFORMANCE THEREOF. RADONAWAY'S AGGREGATE LIABILITY HEREUNDER SHALL NOT IN ANY EVENT EXCEED THE AMOUNT OF THE PURCHASE PRICE OF SAID PRODUCT. THE SOLE AND EXCLUSIVE REMEDY UNDER THIS WARRANTY SHALL BE THE REPAIR OR REPLACEMENT OF THE PRODUCT, TO THE EXTENT THE SAME DOES NOT MEET WITH RADONAWAY'S WARRANTY AS PROVIDED ABOVE.

For service under this Warranty, contact RadonAway for a Return Material Authorization (RMA) number and shipping information. No returns can be accepted without an RMA. If factory return is required, the customer assumes all shipping costs, including insurance, to and from factory.

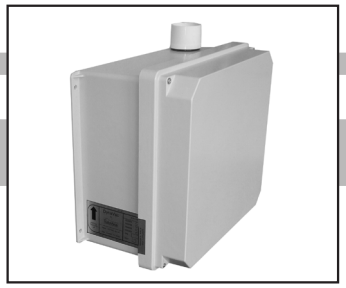
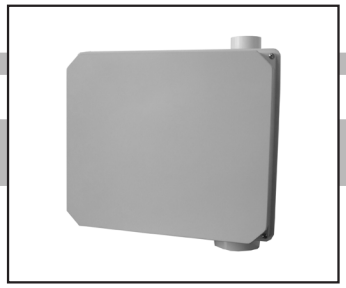
RadonAway® 3 Saber Way
Ward Hill, MA 01835 USA TEL (978) 521-3703
FAX (978) 521-3964
Email to: Returns@RadonAway.com

Record the following information for your records:

Serial Number: _____ Purchase Date: _____

RadonAway®

The World's Leading
Radon Fan Manufacturer

HS Series

Installation & Operating Instructions

RadonAway
3 Saber Way | Ward Hill, MA 01835
www.radonaway.com

P/N IN007-REV K

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RadonAway Ward Hill, MA.

HS Series Fan Installation & Operating Instructions

Please Read and Save These Instructions.

DO NOT CONNECT POWER SUPPLY UNTIL FAN IS COMPLETELY INSTALLED. MAKE SURE ELECTRICAL SERVICE TO FAN IS LOCKED IN "OFF" POSITION. DISCONNECT POWER BEFORE SERVICING FAN.

1. **WARNING!** Do not use fan in hazardous environments where fan electrical system could provide ignition to combustible or flammable materials.
2. **WARNING!** Do not use fan to pump explosive or corrosive gases.
   See Vapor Intrusion Application Note #AN001 for important information on VI applications. RadonAway.com/vapor-intrusion
3. **WARNING!** Check voltage at the fan to insure it corresponds with nameplate.
4. **WARNING!** Normal operation of this device may affect the combustion airflow needed for safe operation of fuel burning equipment. Check for possible backdraft conditions on all combustion devices after installation.
5. **NOTICE!** There are no user serviceable parts located inside the fan unit.
   Do NOT attempt to open. Return unit to the factory for service.
6. All wiring must be performed in accordance with the National Fire Protection Association's (NFPA)"National Electrical Code, Standard #70"-current edition for all commercial and industrial work, and state and local building codes. All wiring must be performed by a qualified and licensed electrician.
7. **WARNING!** In the event that the fan is immersed in water, return unit to factory for service before operating.
8. **WARNING!** Do not twist or torque fan inlet or outlet piping as Leakage may result.
9. **WARNING!** Do not leave fan unit installed on system piping without electrical power for more than 48 hours. Fan failure could result from this non-operational storage.
10. **WARNING!** TO REDUCE THE RISK OF FIRE, ELECTRIC SHOCK, OR INJURY TO PERSONS, OBSERVE THE FOLLOWING:

    a) Use this unit only in the manner intended by the manufacturer. If you have questions, contact the manufacturer.

    b) Before servicing or cleaning unit, switch power off at service panel and lock the service disconnecting means to prevent power from being switched on accidentally. When the service disconnecting means cannot be locked, securely fasten a prominent warning device, such as a tag, to the service panel.

1.0 SYSTEM DESIGN CONSIDERATIONS

1.1 INTRODUCTION

The HS Series Fan is intended for use by trained, certified/licensed, professional Radon mitigators. The purpose of this instruction is to provide additional guidance for the most effective use of the HS Series Fan. This instruction should be considered as a supplement to EPA/Radon Industry standard practices, state and local building codes and state regulations. In the event of a conflict, those codes, practices and regulations take precedence over this instruction.

1.2 ENVIRONMENTALS

The HS Series Fan is designed to perform year-round in all but the harshest climates without additional concern for temperature or weather. For installations in an area of severe cold weather, please contact RadonAway for assistance. When not in operation, the HS Series Fan should be stored in an area where the temperature is never less than 32 degrees F. or more than 100 degrees F. The HS Series Fan is thermally protected such that it will shut off when the internal temperature is above 104 degrees F. Thus if the HS Series Fan is idle in an area where the ambient temperature exceeds this shut off, it will not restart until the internal temperature falls below 104 degrees F.

1.3 ACOUSTICS

The HS Series Fan, when installed properly, operates with little or no noticeable noise to the building occupants. There are, however, some considerations to be taken into account in the system design and installation. When installing the HS Series Fan above sleeping areas, select a location for mounting which is as far away as possible from those areas. Avoid mounting near doors, fold-down stairs or other uninsulated structures which may transmit sound. Insure a solid mounting for the HS Series Fan to avoid structure-borne vibration or noise.

The velocity of the outgoing air must also be considered in the overall system design. With small diameter piping, the "rushing" sound of the outlet air can be disturbing. The system design should incorporate a means to slow and quiet the outlet air. The use of the RadonAway Exhaust Muffler, p/n 24002, is strongly recommended.

1.4 GROUND WATER

Under no circumstances should water be allowed to be drawn into the inlet of the HS Series Fan as this may result in damage to the unit. The HS Series Fan should be mounted at least 5 feet above the slab penetration to minimize the risk of filling the HS Series Fan with water in installations with occasional high water tables.

In the event that a temporary high water table results in water at or above slab level, water will be drawn into the riser pipes thus blocking air flow to the HS Series Fan. The lack of cooling air will result in the HS Series Fan cycling on and off as the internal temperature rises above the thermal cutoff and falls upon shutoff. Should this condition arise, it is recommended that the HS Series Fan be disconnected until the water recedes allowing for return to normal operation.

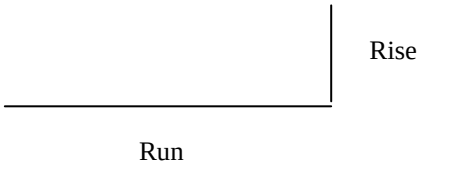
1.5 CONDENSATION & DRAINAGE

(WARNING!: Failure to provide adequate drainage for condensation can result in system failure and damage the HS Series Fan).

Condensation is formed in the piping of a mitigation system when the air in the piping is chilled below its dew point. This can occur at points where the system piping goes through unheated space such as an attic, garage or outside. The system design must provide a means for water to drain back to a slab hole to remove the condensation.

The use of small diameter piping in a system increases the speed at which the air moves. The speed of the air can pull water uphill and at sufficient velocity it can actually move water vertically up the side walls of the pipe. This has the potential of creating a problem in the negative pressure (inlet) side piping. For HS Series Fan inlet piping, the following table provides the minimum recommended pipe diameters as well as minimum pitch under several system conditions. Use this chart to size piping for a system.

Pipe Diam.	Minimum Rise per Foot of Run*		
	@ 25 CFM	@ 50 CFM	@ 100 CFM
4"	1/32 "	3/32 "	3/8 "
3"	1/8 "	3/8 "	1 1/2 "



*Typical operational flow rates:

HS3000, or HS5000	20 - 40 CFM
HS2000	50 - 90 CFM

All exhaust piping should be 2" PVC.

1.6 SYSTEM MONITOR AND LABEL

A properly designed system should incorporate a "System On" Indicator for affirmation of system operation. A Magnehelic pressure gauge is recommended for this purpose. The indicator should be mounted at least 5 feet above the slab penetration to minimize the risk of filling the gauge with water in installations with occasional high water tables. A System Label (P/N 15022) with instructions for contacting the installing contractor for service and also identifying the necessity for regular radon tests to be conducted by the building occupants, must be conspicuously placed where the occupants frequent and can see the label.

1.7 SLAB COVERAGE

The HS Series Fan can provide coverage of well over 1000 sq. ft. per slab penetration. This will, of course, depend on the sub-slab aggregate in any particular installation and the diagnostic results. In general, sand and gravel are much looser aggregates than dirt and clay. Additional suction points can be added as required. It is recommended that a small pit (2 to 10 gallons in size) be created below the slab at each suction hole.

1.8 ELECTRICAL WIRING

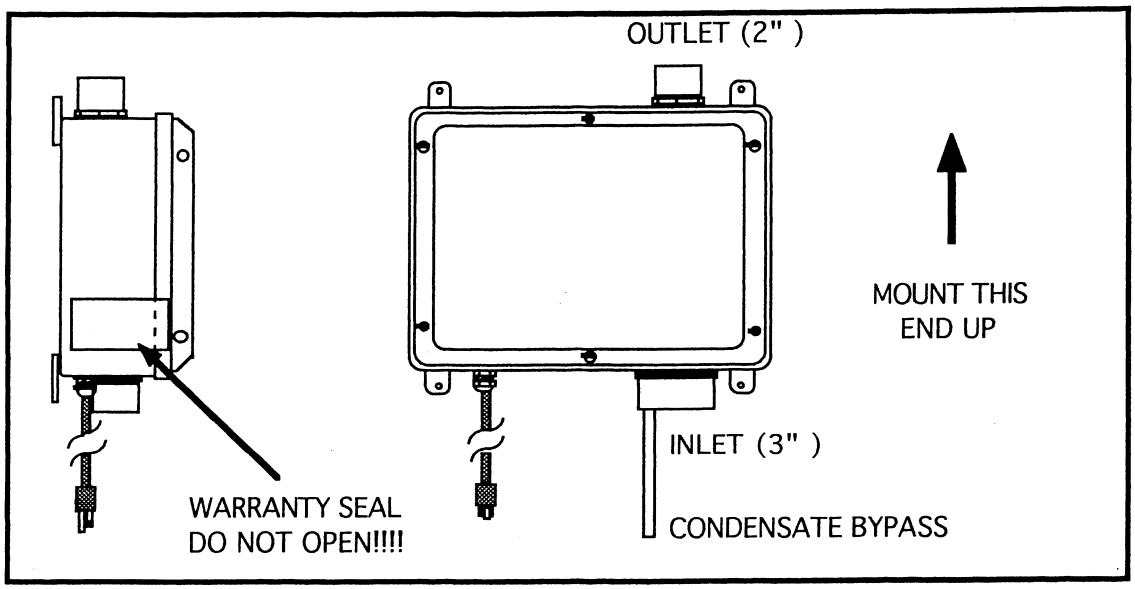
The HS Series Fan plugs into a standard 120V outlet. All wiring must be performed in accordance with the National Fire Protection Association's (NFPA)"National Electrical Code, Standard #70"-current edition for all commercial and industrial work, and state and local building codes. All wiring must be performed by a qualified and licensed electrician. Outdoor installations require the use of a U.L. listed watertight conduit. Ensure that all exterior electrical boxes are outdoor rated and properly caulked to prevent water penetration into the box. A means, such as a weep hole, is recommended to drain the box.

1.8a ELECTRICAL BOX (optional)

The optional Electrical Box (p/n 20003) provides a weather tight box with switch for outdoor hardwire connection. All wiring must be performed in accordance with the National Fire Protection Association's (NFPA)"National Electrical Code, Standard #70"-current edition for all commercial and industrial work, and state and local building codes. All wiring must be performed by a qualified and licensed electrician. Outdoor installations require the use of a U.L. listed watertight conduit. Ensure that all exterior electrical boxes are outdoor rated and properly caulked to prevent water penetration into the box. A means, such as a weep hole, is recommended to drain the box.

1.9 SPEED CONTROLS

Electronic speed controls can **NOT** be used on HS Series units.



2.0 INSTALLATION

2.1 MOUNTING

Mount the HS Series Fan to the wall studs, or similar structure, in the selected location with (4) 1/4" x 1 1/2" lag screws (not provided). Insure the HS Series Fan is both plumb and level.

2.2 DUCTING CONNECTIONS

Make final ducting connection to HS Series Fan with flexible couplings. Insure all connections are tight. Do not twist or torque inlet and outlet piping on HS Series Fan or leaks may result.

2.3 VENT MUFFLER INSTALLATION

Install the muffler assembly in the selected location in the outlet ducting. Solvent weld all connections. The muffler is normally installed above the roofline at the end of the vent pipe.

2.5 OPERATION CHECKS & ANNUAL SYSTEM MAINTENANCE

____ Make final operation checks by verifying all connections are tight and leak-free.

____ Insure the HS Series Fan and all ducting is secure and vibration-free.

____ Verify system vacuum pressure with Magnehelic. Insure vacuum pressure is within normal operating range and less than the maximum recommended as shown below:

HS2000	14" WC
HS3000	21" WC
HS5000	40" WC

(Above are based on sea-level operation, at higher altitudes reduce above by about 4% per 1000 Feet.) If these are exceeded, increase number of suction points.

____ Verify Radon levels by testing to EPA protocol.

PRODUCT SPECIFICATIONS

Model	Maximum Static Suction	Typical CFM vs Static Suction WC (Recommended Operating Range)						Power* Watts @ 115 VAC
		0"	10"	15"	20"	25"	35"	
HS2000	18"	110	72	40	-	-	-	150-270
HS3000	27"	40	33	30	23	18	-	105-195
HS5000	50"	53	47	42	38	34	24	180-320

*Power consumption varies with actual load conditions

Inlet: 3.0" PVC

Outlet: 2.0" PVC

Mounting: Brackets for vertical mount

Weight: Approximately 18 lbs.

Size: Approximately 15"W x 13"H x 8"D

Minimum recommended inlet ducting (greater diameter may always be used):

HS3000, HS5000 --- 2.0" PVC Pipe

HS2000 --- Main feeder line of 3.0" or greater PVC Pipe

Branch lines (if 3 or more) may be 2.0" PVC Pipe

Outlet ducting: 2.0" PVC

Storage temperature range: 32 - 100 degrees F.

Thermally protected

Locked rotor protection

Internal Condensate Bypass

IMPORTANT INSTRUCTIONS TO INSTALLER

Inspect the HS Series Fan for shipping damage within 15 days of receipt. Notify **RadonAway® of any damages immediately**. RadonAway® is not responsible for damages incurred during shipping. However, for your benefit, RadonAway® does insure shipments.

There are no user serviceable parts inside the fan. **Do not attempt to open.** Return unit to factory for service.

Install the HS Series Fan in accordance with all EPA standard practices, and state and local building codes and state regulations.

Provide a copy of this instruction or comparable radon system and testing information to the building occupants after completing system installation.

WARRANTY

RadonAway® warrants that the HS Series Fan (the "Fan") will be free from defects in materials and workmanship for a period of 90 days from the date of purchase (the "Warranty Term").

RadonAway® will replace any Fan which fails due to defects in materials or workmanship during the Warranty Term. The Fan must be returned (at Owner's cost) to the RadonAway® factory. Any Fan returned to the factory will be discarded unless the Owner provides specific instructions along with the Fan when it is returned regardless of whether or not the Fan is actually replaced under this warranty. Proof of purchase must be supplied upon request for service under this Warranty.

This Warranty is contingent on installation of the Fan in accordance with the instructions provided. This Warranty does not apply where any repairs or alterations have been made or attempted by others, or if the unit has been abused or misused. Warranty does not cover damage in shipment unless the damage is due to the negligence of RadonAway®.

1 YEAR EXTENDED WARRANTY WITH PROFESSIONAL INSTALLATION.

RadonAway® will extend the Warranty Term of the fan to one (1) year from date of purchase or fifteen (15) months from the date of manufacture, whichever is sooner, if the Fan is installed in a professionally designed and professionally installed active soil depressurization system or installed as a replacement fan in a professionally designed and professionally installed active soil depressurization system by a qualified installer. Proof of purchase and/or proof of professional installation may be required for service under this warranty. Outside the Continental United States and Canada the extended Warranty Term is limited to one (1) year from the date of manufacture.

RadonAway® is not responsible for installation, removal or delivery costs associated with this Warranty.

LIMITATION OF WARRANTY

EXCEPT AS STATED ABOVE, THE HS SERIES FANS ARE PROVIDED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

IN NO EVENT SHALL RADONAWAY BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR RELATING TO, THE FAN OR THE PERFORMANCE THEREOF. RADONAWAY'S AGGREGATE LIABILITY HEREUNDER SHALL NOT IN ANY EVENT EXCEED THE AMOUNT OF THE PURCHASE PRICE OF SAID PRODUCT. THE SOLE AND EXCLUSIVE REMEDY UNDER THIS WARRANTY SHALL BE THE REPAIR OR REPLACEMENT OF THE PRODUCT, TO THE EXTENT THE SAME DOES NOT MEET WITH RADONAWAY'S WARRANTY AS PROVIDED ABOVE.

For service under this Warranty, contact RadonAway for a Return Material Authorization (RMA) number and shipping information. No returns can be accepted without an RMA. If factory return is required, the customer assumes all shipping costs, including insurance, to and from factory.

RadonAway® 3 Saber Way
Ward Hill, MA 01835 USA TEL (978) 521-3703
FAX (978) 521-3964
Email to: Returns@RadonAway.com

Record the following information for your records:

Serial No._____ Purchase Date_____