



Ecosystems Strategies, Inc.

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phone 845.452.1658 | fax 845.485.7083 | ecosystemsstrategies.com

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APR 09 2015

Remedial Bureau C
Div of Environmental Remediation

April 7, 2015

Mr. Wayne Mizerak
New York State Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway, 11th Floor
Albany, New York 12233

via Email: wayne.mizerak@dec.ny.gov

Re: Letter Report for the Design of the Sub-Slab Depressurization System at the
Blauvelt Laundry Site, located at 549 Western Highway, Town of Orangetown
Rockland County, New York
ESI File: RO07010.40; NYSDEC ID: 344037

Dear Mr. Mizerak:

This Letter Report (Report) by Jansen Engineering, PLLC (JE) and Ecosystems Strategies, Inc. (ESI), prepared on behalf of R.M.G.K Realty Corporation, details the design elements of the proposed sub-slab depressurization system (SSDS) at the above-referenced property.

The SSDS is an interim remedial measure for the property described in the NYSDEC-approved Interim Remedial Measures Work Plan (IRM WP, July 2014) prepared by JE and ESI. The 0.29-acre property contains a commercial building consisting of three storefronts occupied by Orangetown Florist (northern end), Blue Hill Cleaners (dry-cleaning facility, central portion), and Blauvelt Station One Deli (southern end). The SSDS will mitigate elevated levels of tetrachloroethene (PCE) and PCE-breakdown products present in soil-gas beneath the commercial building. The SSDS system will draw soil-gas beneath the concrete slab of the building via extraction points connected to fan-powered vents discharging above the roofline.

CERTIFICATION AND GUIDANCE DOCUMENTS

This Report has been prepared under the direct supervision of, and certified by, a New York State registered professional engineer (NYS PE) as specified in the Division of Environmental Remediation-10 Technical Guidance for Site Investigation and Remediation. The NYS PE certification for this Report is presented as Attachment A.

The SSDS was designed in conformance with the following applicable standards and guidelines:

- Standard Practice for Installing Radon Mitigation Systems in Existing Low-Rise Residential Buildings, Designation: E2121-13, prepared by American Society for Testing Materials, March 2013;
- Guidance for Evaluating Soil Vapor Intrusion in the State of New York, prepared by the New York State Department of Health (NYSDOH Guidance), October 2006;
- Radon Prevention in the Design and Construction of Schools and Other Large Buildings, prepared by the United States Environmental Protection Agency (USEPA), June 1994; and,
- Sub-slab Depressurization for Low Permeability Fill Material, prepared by USEPA, July 1991.



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REVIEW OF FOUNDATION PLAN

ESI and JE personnel reviewed a foundation plan (dated 1964) pertaining to the central and southern portions of the commercial building (corresponding to the building portions currently occupied by Blue Hill Cleaners and Blauvelt Station One Deli). The foundation plan shows interior footings dividing these areas into eight distinct sub-slab areas. Interior footings act as a barrier to soil-gas flow underneath the slab, creating poor communication between distinct sub-slab areas. Interior and exterior footings extend approximately 36-inches below surface grade (bsg). A 3-inch layer of gravel is shown underneath the building slab. The foundation plan is presented as Attachment B. No foundation plan for the northern portion of the building (currently occupied by Orangetown Florist) was present in the readily available records of the Town of Orangetown Building Department.

FIELD INSPECTIONS AND TESTING

ESI and JE personnel performed an inspection and conducted field testing at the building on March 17 and 24, 2015. The inspection consisted of the preliminary identification of potential extraction and discharge points for the SSDS. Preliminary extraction point locations were identified based on the extent of any given sub-slab area as identified in the foundation plan, and potential interference from existing utilities, on-site equipment, and building structural components. Preliminary discharge point locations were identified based on accessibility and proximity to windows, doors and HVAC equipment. Proposed locations for extraction and discharge points are presented in Figure 2, Attachment C. (Note: No extraction point was identified for the southeast corner of the Blauvelt Station One Deli space as the entire sub-slab area at this location is occupied by a walk-in cooler, which is a non-continuously occupied space.)

A sub-slab pressure field extension test was conducted in the central portion of the building (northern portion of the space currently occupied by Blue Hill Cleaners). A temporary 1-inch diameter suction point (SP-01) and three temporary ½ -inch diameter temporary monitoring points (MP-01, MP-02 and MP-03) were extended through the building slab. Suction point SP-01 was located towards the rear of the store. Monitoring point MP-01 was located 3.5 feet east of SP-01, and MP-02 and MP-03 were located west of SP-01 (16.5 and 25 feet, respectively) towards the front of the store. Temporary points SP-01, MP-02 and MP-03 were located within the same sub-slab area as identified in the foundation plan. Monitoring point MP-01 was located outside of the sub-slab area.

Negative pressure was applied to the suction point with a RIGID® 14 gallon High Performance Wet/Dry Vacuum (Model WD14500, 50 inches of water column [in. w.c.], and 168 cubic feet per minute [CFM]). Results for the sub-slab pressure field extension test are presented in Table 1, below.

Table 1: Sub-slab pressure field extension measurements

ID	Location	Distance to SP-01 (feet)	Pressure prior to vacuum (in. w.c.)	Pressure during vacuum (in. w.c.)
SP-01	Within sub-slab area	0	0.000	N/A
MP-01	Outside sub-slab area, east of SP-01	3.5	0.000	-0.001
MP-02	Within sub-slab area, west of SP-01	16.5	0.000	-0.027
MP-03	Within sub-slab area, west of SP-01	25	0.000	-0.013



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Field extension measurements indicate that the radius of influence (RI) is greater than 25 feet, under field testing conditions. A 25 foot RI is indicative of good sub-slab communication within sub-slab areas. Field extension measurements between SP-01 and MP-01 (located in a different a sub-slab area) show that negligible negative pressure was measured, indicative of poor sub-slab communication in distinct sub-slab areas. These findings confirm the conclusion that one extraction point per sub-slab area will be necessary to create negative pressure underneath the entire building slab.

SSDS MECHANICAL COMPONENTS

The major components of the SSDS will include:

- Nine extraction points;
- Vertical, horizontal and manifold piping throughout the building;
- Two temporary carbon filtration systems (55-gallon drums and associated piping); and
- Two exterior vertical exhaust stacks, each equipped with a powered fan.

The proposed locations of the nine extraction points were selected to provide negative pressure at each sub-slab area bounded by interior footings. The location and construction requirements for the extraction points are presented in Figures 1 and 2, Attachment C. Each extraction point will be attached to a vertical pipe (3-inch diameter non-perforated schedule 40 PVC). An overhead horizontal piping system (4-inch diameter non-perforated schedule 40 PVC) will connect multiple vertical pipes and extraction points.

The horizontal piping will be routed to two overhead manifold pipes (4-inch diameter non-perforated schedule 40 PVC). Each manifold pipe will connect to an exterior vertical exhaust stack connected to a powered fan. The proposed manifold pipe in the eastern portion (rear) of the building will exit the building and be routed upwards via the eastern exterior wall. The proposed manifold pipe in the western portion (front) of the building will exit the building via the roof. Location and construction details for the system piping are presented in Figures 1 and 2, Attachment C. All piping locations are approximate and subject to modification.

Temporary carbon filtration systems will be installed along each manifold piping at the utility and storage rooms as a preventive measure. The carbon filtration system will treat soil-gas through an activated carbon units prior to discharge during the system start-up and initial testing. A determination will be made regarding the need for long-term treatment after the collection of system effluent samples (see Section "System Start-up and Initial Testing", below). Based on soil-gas laboratory data and anticipated system flow rate, the use of one 55-gallon drum per discharge point is anticipated. Documentation on the proposed carbon filtration system is presented in Attachment D.

The SSDS system will utilize two roof fans, one at each exterior vertical exhaust stack as an activate ventilation device. A FanTech HP190SL Model Fan (HP190SL Fan) or comparable model is recommended for the installation along the exterior wall (F-01). A FanTech HP220 Model Fan (HP220 Fan) or comparable model is recommended for the roof installation (F-02). Documentation on the HP190SL and HP220 Fans is presented in Attachment E. Each fan will be hard-wired to a dedicated breaker in accordance with local and state electrical codes.



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SSDS MONITORING COMPONENTS

Permanent sub-slab monitoring points

The installation of permanent sub-slab monitoring points (SSMPs) is proposed at each sub-slab area bounded by interior footings to measure negative pressure underneath the building slab. The proposed locations of the SSMPs are presented in Figure 2.

The SSMPs will be constructed with a ½-inch hole from the top of the concrete slab to 6 inches below the bottom of the concrete slab and counter-bored with a 1-inch bit to approximately 3 inches bsg to accommodate a fitting. The fitting will consist of a brass compression coupler with ¼-inch plastic tubing at one end and a removable sealed cap at the other end to insert a portable manometer. The last 3 inches of the plastic tubing will be perforated to allow for the movement of vapors from beneath the concrete slab into the tubing. The coupler and tubing will be placed in the hole and the space below and around the tubing and the bottom of the coupler will be filled with porous clean backfill. The compression coupler and the tubing will be set in place with quick setting hydraulic cement. A plastic cap will cover each SSMP.

Sample port

The installation of sample ports is proposed at each vertical pipe and along each manifold piping before and after the carbon filtration system to measure negative pressure and air flow within the SSDS system, and for the collection of soil-gas samples, as needed. The sample port will consist of a ¼" ball valve and hose barb. The proposed location of the sample port along the vertical pipe is presented in Figure 1.

Visual indicator

The installation of a U-manometer is proposed at each of the vertical pipes to provide a visual warning sign of insufficient vacuum underneath the building. A Suncourt PI1004 Air Pressure Indicator or comparable U-manometer is recommended. The proposed location of the U-manometer along the vertical pipe is presented in Figure 1.

SYSTEM START-UP AND INITIAL TESTING

The following activities will be conducted for start-up of the SSDS:

1. Prior to system start-up all visible SSDS components will be visually inspected for verification of proper installation. The system will be temporarily started and fans will be inspected for proper functioning. The SSDS will be shut off and documentation of system conditions will be recorded.
2. An assessment of sub-slab pressure, both with the system off and with the system temporarily on, will be made at each SSMP using a digital micro-manometer. A difference in pressure of -0.002 in. w.c. at each SSMP will be considered acceptable. Observed pressure readings that fall short of these standards may indicate the need for system modification, such as the installation of additional extraction point(s) or fan(s).



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3. The system will be operated for a minimum of 12 hours and pre- and post-carbon filtration effluent air samples will be subsequently collected and analyzed for VOCs (USEPA Method TO-15) in accordance with the NYSDOH Guidance. These data will be used to determine the need for and extent of an air quality permit per the requirements of Air Guide I, and determine if carbon filtration is needed to treat the system effluent.
4. The proper functioning of the U-manometer as a visual pressure indicator will be confirmed.
5. The system will be permanently engaged following the completion of system modifications.
6. Sub-slab pressures at each monitoring point, laboratory results for effluent air samples, recommendations for system modification (if necessary), and an assessment of all the mechanical components of the system, including visual pressure indicators, will be reported to NYSDEC and NYSDOH.

The system testing described above will be conducted anytime the system is restarted following significant modifications.

Indoor air quality monitoring

One round of air quality sampling will be conducted to document acceptable indoor air quality inside the commercial building. The air sampling will be conducted during the winter months following the installation and initial operation of the SSDS and the completion of planned soil excavation and backfilling activities. The sampling event will consist of the collection of one indoor air sample per storefront (three indoor air samples total) and one outdoor air sample. Samples will be collected utilizing NYSDOH Guidance methodology and submitted for laboratory analysis of VOCs via USEPA Method TO-15. Proposed sampling times, locations and durations will be submitted to NYSDEC and NYSDOH for approval prior to conducting the sampling. The proposed protocol for indoor air sampling and analysis is presented in the NYSDEC-approved Quality Assurance Project Plan, included in the IRM WP.

SCHEDULE AND REPORTING

ESI and JE will commence the work outlined in this Report within 14 days of receiving approval from NYSDEC and NYSDOH. A Summary Letter Report documenting the installation, start-up and initial testing of the SSDS will be prepared within two weeks of the completion of the work. The Summary Letter Report will provide operation and maintenance requirements for the SSDS, inclusive of periodic reporting and inspections.



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Should you have any questions or concerns relative to this Report, please do not hesitate to contact us.

Sincerely,

ECOSYSTEMS STRATEGIES, INC.

Paul H. Ciminello, QEP
President

JJ/PHC/RAM:ndc

Attachments:

- A Certification
- B Foundation Plan
- C SSDS Design Figures
- D Carbon Filtration System Documentation
- E Fan Tech Documentation

cc:

Irene McCarthy
James Licata, Esq.
J. Jansen, P.E., JE
R. Andújar-McNeil, ESI

imccarthykw@gmail.com
licataconklin@gmail.com
jjansen@jansen-engineering.com
Rosaura@ecosystemsstrategies.com



Ecosystems Strategies, Inc.

ATTACHMENT A

Certification



CERTIFICATION

I, Jolanda G. Jansen, certify that I am currently a NYS registered professional engineer and that this Letter Report (April 2015) detailing the design elements of the proposed sub-slab depressurization system (SSDS) at the Blauvelt Laundry Site was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation and the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York.



NYS Professional Engineer #068972-1

4/7/2015

Date



Signature/Stamp



Ecosystems Strategies, Inc.

ATTACHMENT B

Foundation Plan

CONTRACTOR TO VERIFY ALL DIMENSIONS
AND CONDITIONS ON THE JOB

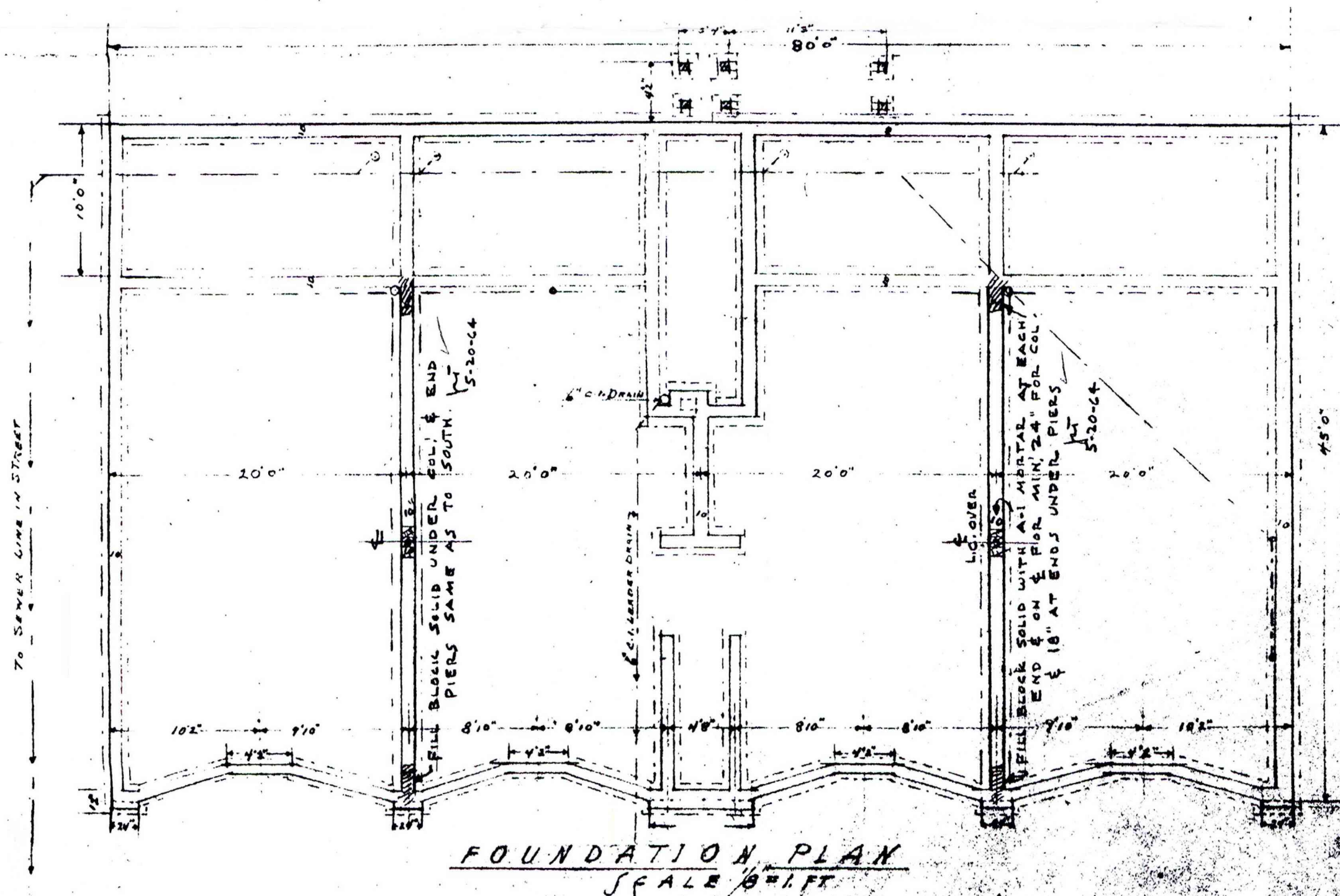
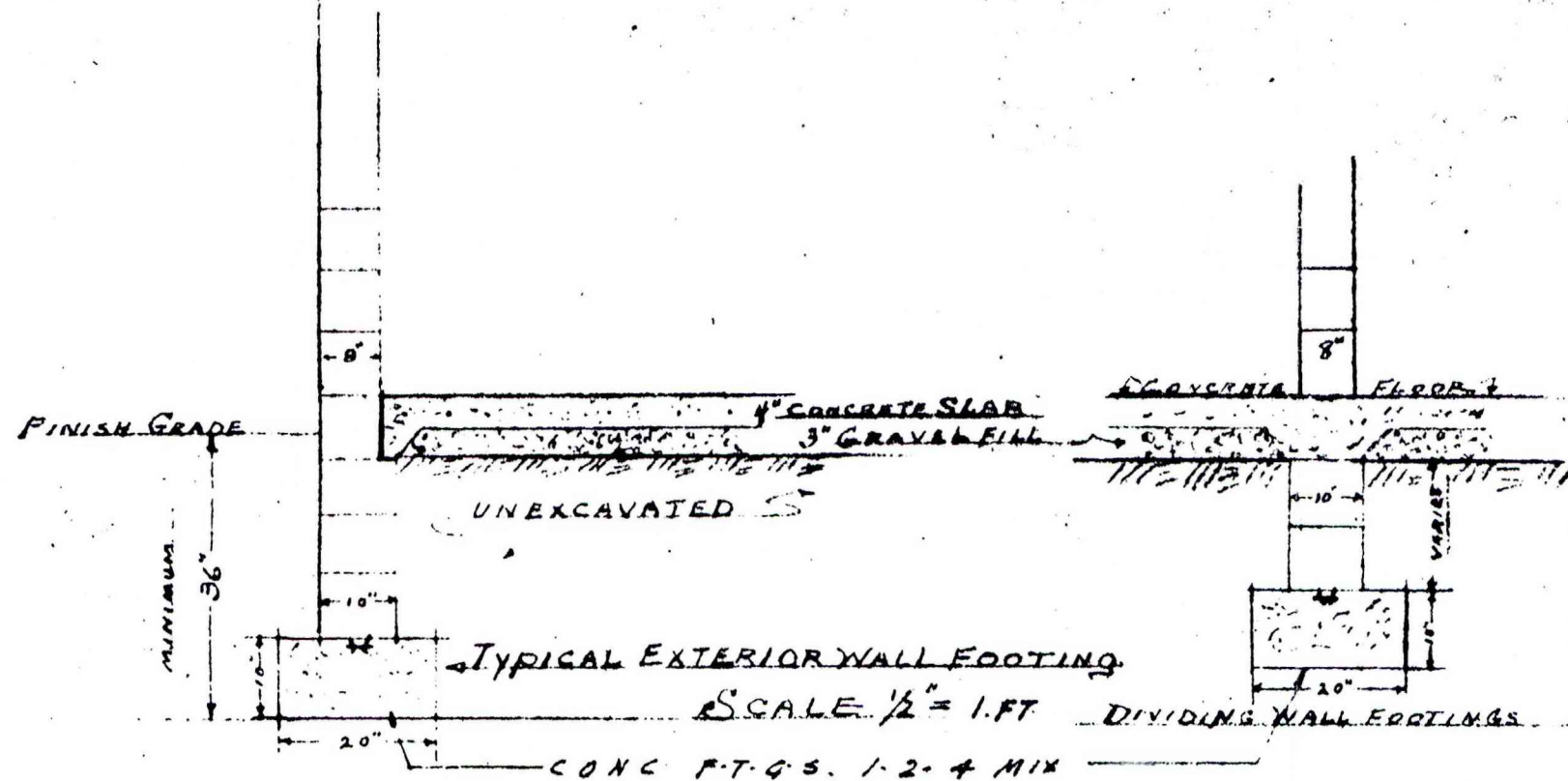
JOHN STONE THOMAS
ARCHITECT
105 SOUTH HIGHLAND AVE.
NEW YORK, N.Y.
TEL. NY 2-5000



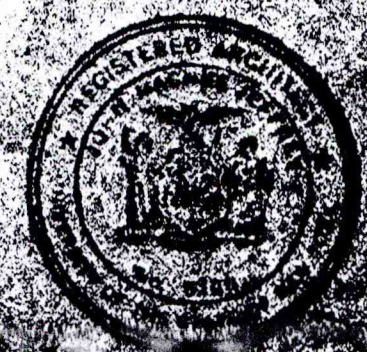
FOR ALTERATION 5-20-64

John Stone Thomas

John Stone Thomas



• STORE AND APARTMENT BUILDING •
FOR
BLAUVELT COMMUNITY CENTER INC.



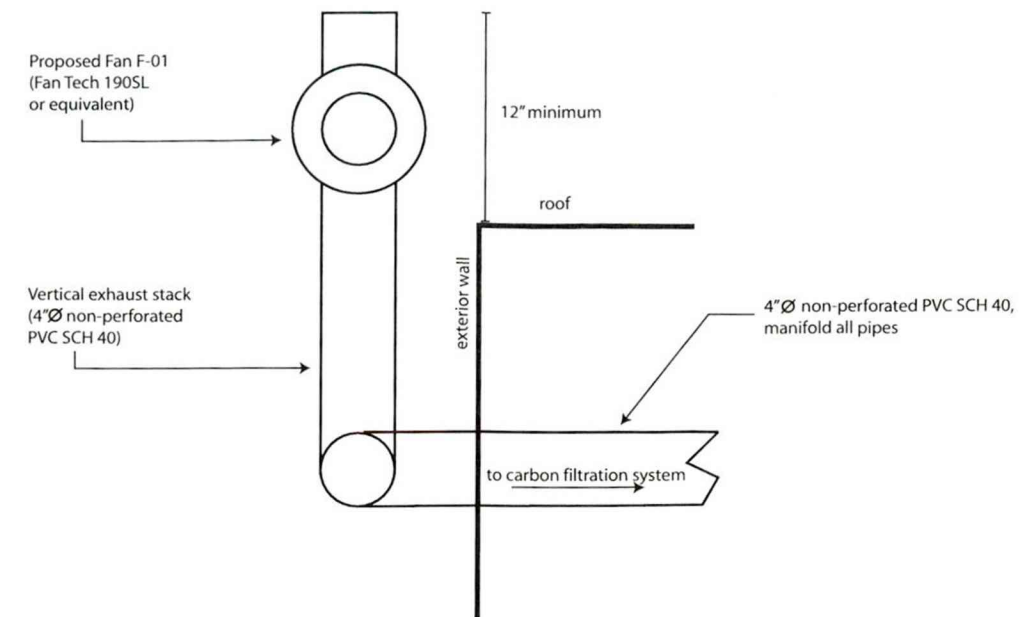


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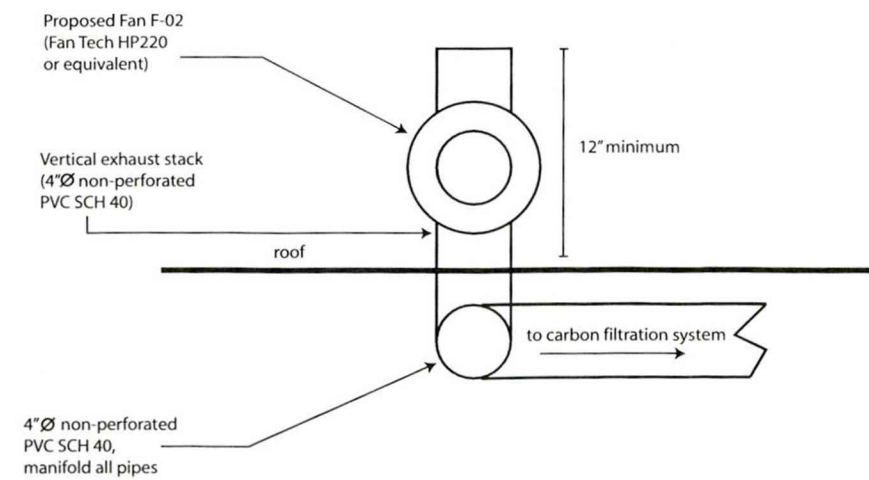
ATTACHMENT C

SSDS Design Figures

EXTERIOR WALL PENETRATION



ROOF PENETRATION



SUB-SLAB EXTRACTION ON POINT CROSS-SECTION

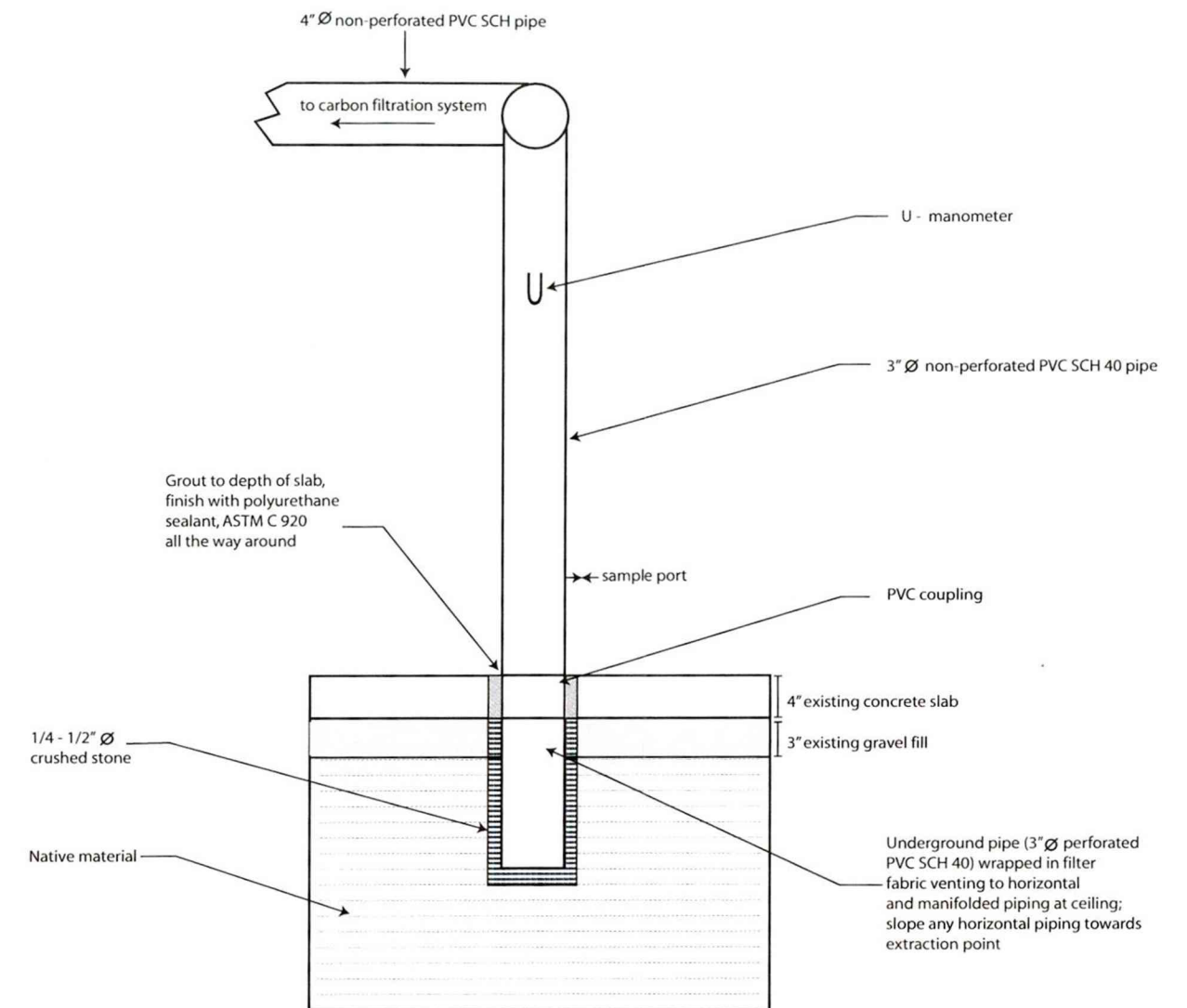


Figure 1: Sub-Slab Extraction Point Cross Section

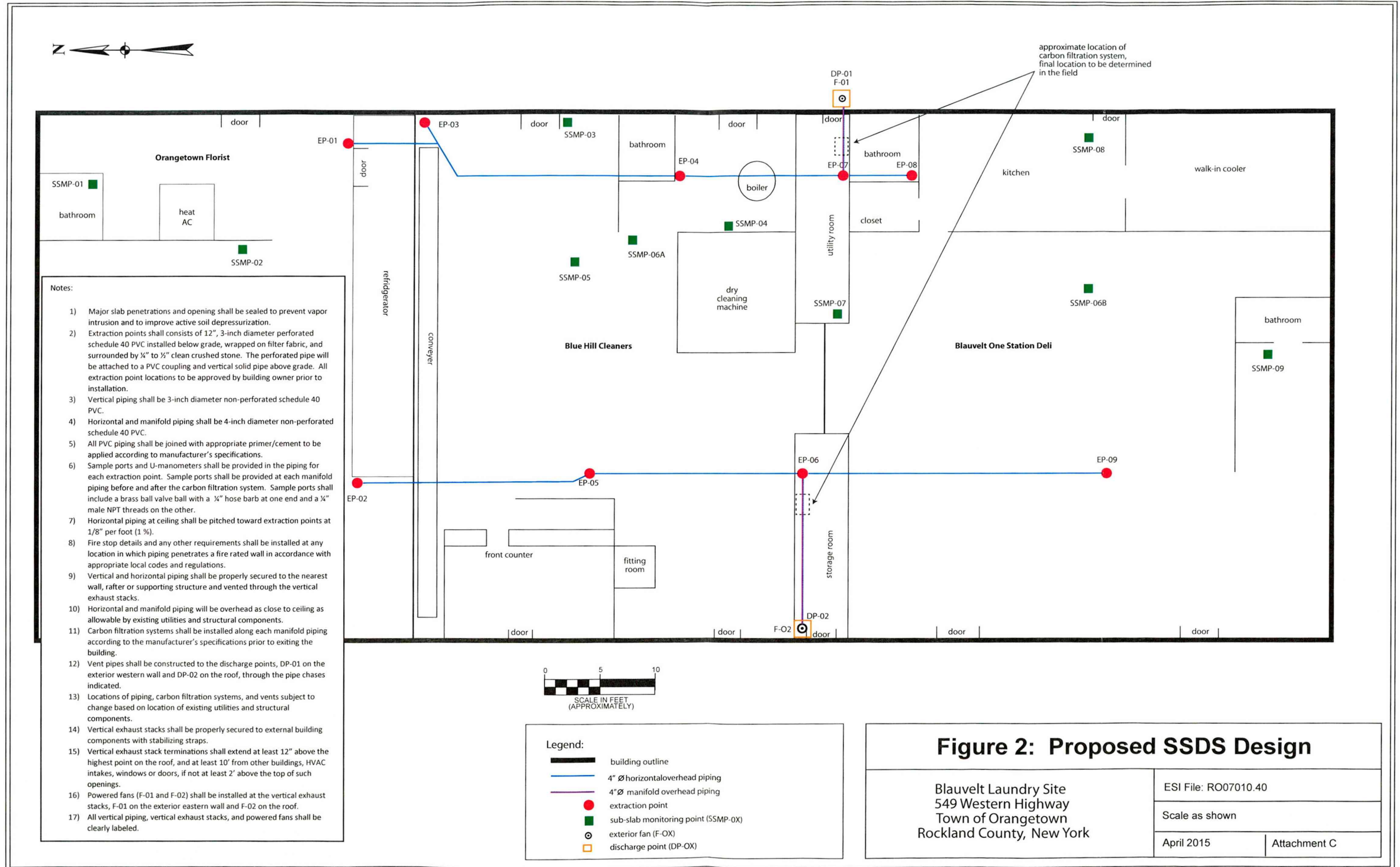
Blauvelt Laundry Site
549 Western Highway
Town of Orangetown
Rockland County, New York

ESI File: RO07010.40

Not to Scale

April 2015

Attachment C





Ecosystems Strategies, Inc.

ATTACHMENT D

Carbon Filtration System Documentation



General Carbon Corporation

Paterson, NJ • Irvine & Sacramento, CA • Starkville, MS • Toronto

"Cleaning The World With Activated Carbon"

33 Paterson Street
Paterson, NJ 07501

T (973)523-2223

F (973)523-1494

sales@generalcarbon.com

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[Facts About Activated Carbon](#)
[Images](#)
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[Home](#) > [Vapor Filtration](#) > The Air General

The Air General

Air Pollution Control Barrels

The General Air Pollution Control Barrels are ready to use, low cost, self-contained air purification adsorbers designed to treat airflow streams of up to 250 CFM. The units are available in four different sizes to better serve your treatment applications.

<u>Specifications</u>	<u>30 Gallon</u>	<u>55 Gallon</u>	<u>85 Gallon</u>	<u>110 Gallon</u>
A – Diameter, Outside:	19-1/2"	24"	28"	32"
B – Height, Outside:	29"	35"	39"	43"
Inlet Fitting:	E-2"MPT	E-2"MPT	C-4"FPT	C-4"FPT
Outlet Fitting:	C-2"MPT	C-2"MPT	D-4"FPT	D-4"FPT
Drain Fitting:	E-2"FPT	E-1"FPT	E-1"FPT	E-1"FPT
Carbon Weight, lbs.:	90	150	300	400
Max Recommended Flow Rate, CFM:	100	100	180	250
Max Pressure, PSIG:	7	10	7	7
Max Design Temp., Fahrenheit:	140	140	140	140
Flow Direction	Upflow	Upflow	Upflow	Upflow

New Products

- [GC ST – H2S Treatment in Low Oxygen Gas Streams](#)
- [GC 12x30SCI – For Chlorinated By-Products & Trihalomethanes](#)

Short Cuts

- [Home](#)
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- [Liquid Products](#)

Activated Carbon – The Air General vapor adsorbers are filled with virgin, high activity, activated carbon. Any of virgin coal, coconut shell, reactivated or impregnated carbons are available as well.

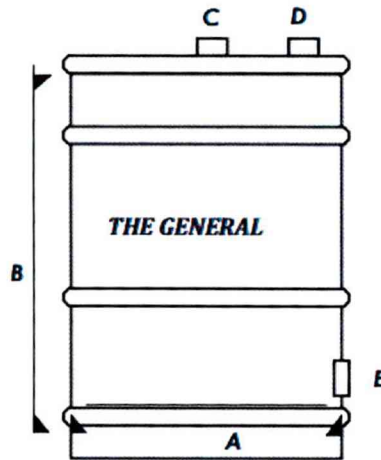
Removable Lid – 16 gauge lid with ring and bolt closure, poly-clad cellulose gasket.

Connections – Metal connections with standard pipe threads insure easy, durable and leak-proof hookup to your system. Unions or quick connect fittings are advised to make drum

exchange easy. Drains let you remove any accumulated condensate.

Flow Distributors – The 55 gallon barrel uses an air chamber to insure even distribution of the airflow through the carbon. Low-pressure drop slotted Schedule 40 PVC collectors are used in the 85 gallon and 110 gallon drums for proper flow distribution. Stainless Steel internals and drums are available for special applications.

Coatings – The Air General pollution control barrels are coated on the inside with heat cured phenolic epoxy. The outside coating is industrial enamel. A polyethylene liner is available for extra corrosion resistance for the 55 gallon and 85 gallon units.



Installation and Startup – The General air pollution control barrel requires no special procedure for startup. Just connect the inlet and outlet to the treatment system and start it up. Multiple units are usually connected in series with testing advised between the units to determine when the first unit needs to be changed out.

Maintenance – Once connected, The Air General requires no maintenance other than the monitoring of the influent and effluent air streams and the operation pressure of the system. Monitoring the air stream into the last Air Pollution Control Barrel in series mode is a recommended safeguard against breakthrough in the final discharge. When the concentration of contaminants in the outflow equals the concentration in the inflow, The General has reached its removal capacity and should be removed from service. The working life of each adsorber is dependent upon the type of contaminant in the air as well as its concentration and the airflow rate. A pressure relief device is advised to prevent damage to the canister in the event of excessive pressure buildup.

Recharging The General – Once the carbon has reached its pollutant removal capacity, the unit should be removed and replaced with a fresh one. To purchase replacement carbon or to arrange for a carbon change out, please contact our office.

Disposal – Dispose of the spent carbon in accordance with Local, State and Federal regulations.

WARNING!

Wet activated carbon removes oxygen from air causing a severe hazard to workers inside carbon vessels. Confined space / low oxygen procedures should be put in place before any entry is made. Such procedures should comply with all applicable local, state and federal guidelines.

Activated carbon releases heat in its normal operation. Certain chemicals and/or situations can greatly increase the heat released and the potential for fire. If you are dealing with flammable chemicals, understand the correct operation of your system. If you have any questions about the fire potential of your system, please call General Carbon Corporation at 973-523-2223



Ecosystems Strategies, Inc.

ATTACHMENT E

Fan Tech Documentation

HP190SL

Slimline Radon Fans

Product #: 40564



Fantech has utilized its twenty years of experience as a radon fan manufacturer to develop the new HP190SL. This new fan features a patent-pending design starting from its outward low profile appearance to the high efficiency, continuous duty ebm-papst motor and integrated condensate bypass system.

Radon mitigators will appreciate the ease of its direct wall-mount design that eliminates the need for elbows and reduces labor costs.

Features

- Constructed from durable, UV resistant polycarbonate
- Factory sealed, no leak design
- Integral condensate bypass
- Direct wall-mount with integral vibration isolation
- Cabinet is paintable to match external decor. And include masking seal for non-paintable logo medallion.
- Weighs 12 lbs (5 Kg)

Specifications

- Duct size – 4" (102 mm)
- Voltage/Phase – 120/1
- Power rated – 88 W
- Amp – 0.78 A

The HP190SL is engineered specifically for the demanding environments of radon mitigation applications.

Low profile, wall-mount design minimizes installation time.

Fan and discharge pipe are located on surface of exterior wall eliminating need for elbows.

Fan connects directly to low pressure pipe opening on exterior wall.

Motors

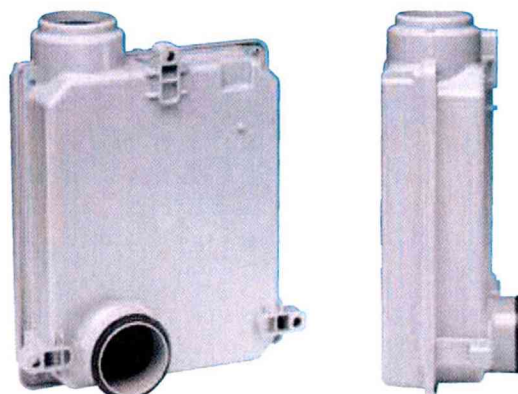
- High efficiency, continuous duty ebm-papst motor.
- Non-overloading motorized impeller.
- Built-in thermal overload protection.

Case

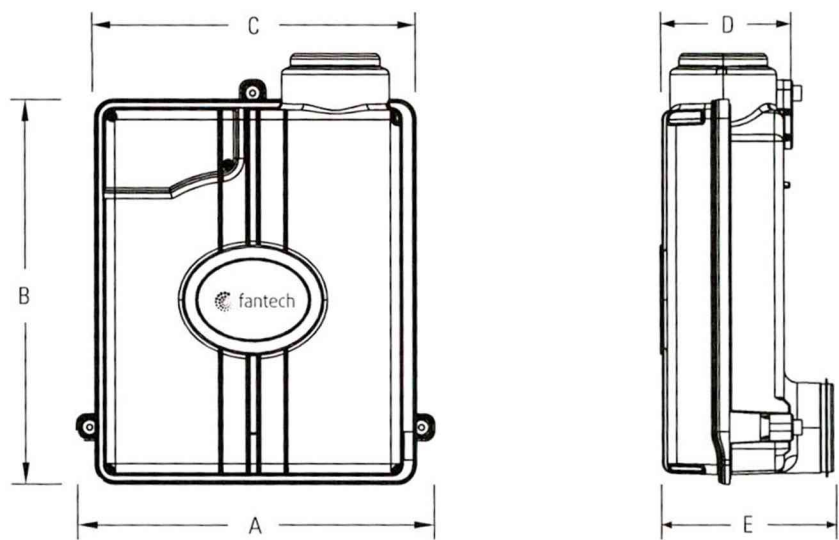
- Constructed from durable, UV resistant polycarbonate.
- Factory sealed, no leak design.
- Integral condensate bypass.
- Direct wall-mount with integral vibration isolation.

Warranty

5 year warranty.



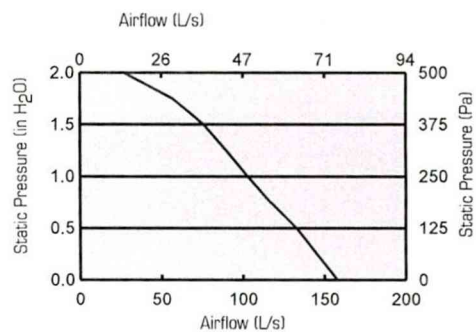
Dimensions & Airflow



Model	A		B		C		D		E	
	in	mm	in	mm	in	mm	in	mm	in	mm
HP 190SL	14 15/16	380	15 7/8	404	13 7/16	341	5 1/16	129	7 3/16	182

Ventilation Performance

in. wg. (Pa)	0.0 (0)	0.5 (125)	1.0 (250)	1.5 (375)	2.0 (500)
	cfm (L/s)	cfm (L/s)	cfm (L/s)	cfm (L/s)	cfm (L/s)
Net airflow	158 (75)	133 (63)	103 (49)	76 (36)	27 (13)



Requirements and standards

- Complies with the UL 507 requirements regulating the construction and installation of Electric Fans

Contacts

Submitted by:	Date:
Quantity:	Model:
Project #:	
Comments:	
Location:	
Architect:	
Engineer:	Contractor:

Distributed by:

United States 10048 Industrial Blvd. • Lenexa, KS 66061 • 1.800.747.1762 • www.fantech.net
Canada 50 Kanalfakt Way • Bouctouche, NB E4S 3M5 • 1.800.565.3548 • www.fantech.net

Fantech, reserves the right to modify, at any time and without notice, any or all of its products' features, designs, components and specifications to maintain their technological leadership position.





Ventilation Solutions

Radon Mitigation



Radon is a health hazard with a simple solution

Radon is everywhere! You can't see radon and you can't smell it or taste it, but it may be a problem in your home. The latest EPA estimate suggests that over 7 million US homes are at risk.

Radon is an odorless, colorless gas that comes from the natural (radioactive) breakdown of uranium in soil, rock and water and contaminates in the air you breathe. According to the EPA, radon is estimated to cause 21,000 lung cancer deaths per year!

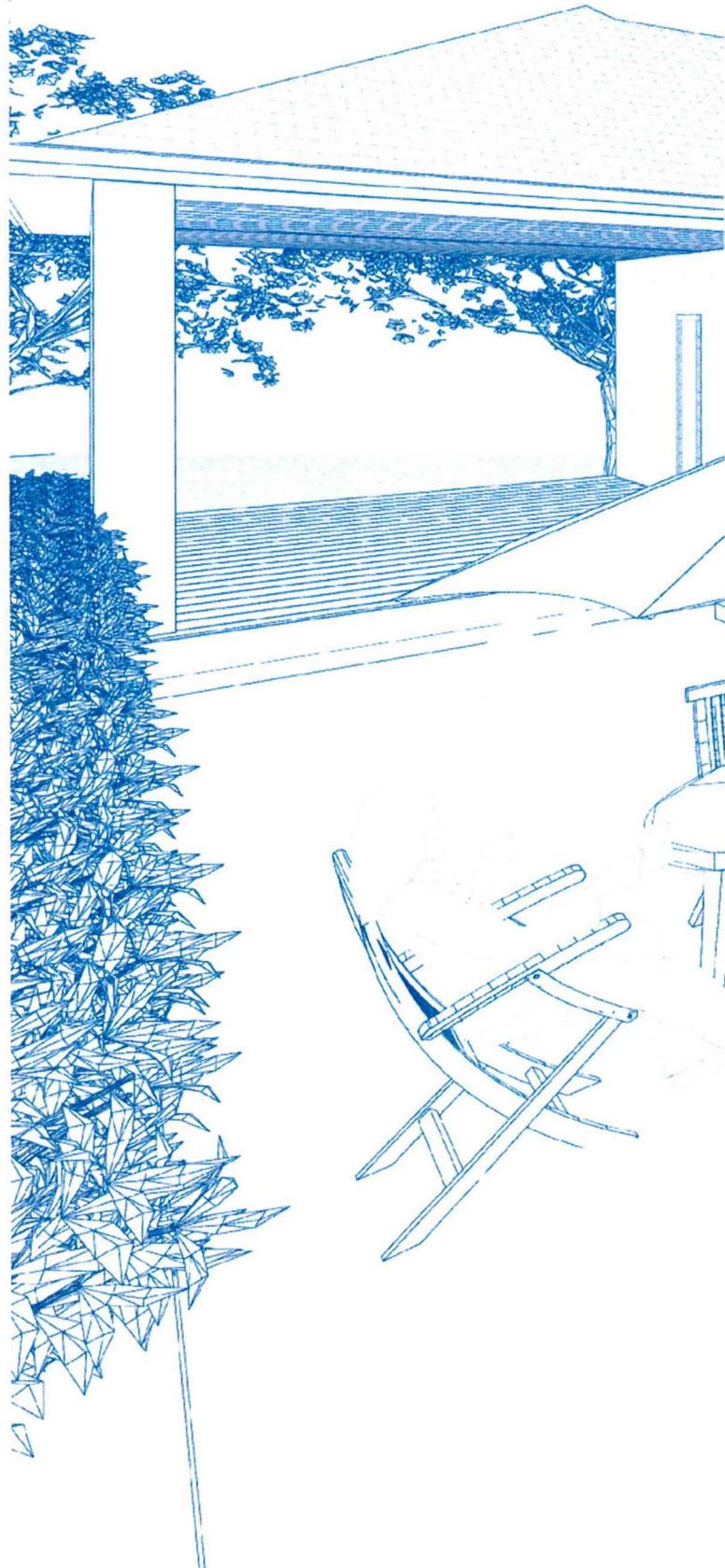
Due to the varying levels of subterranean uranium, Radon levels can change from area to area. However, if you live in a high risk region, Radon exposure can be concentrated in your home where the gas is trapped if proper mitigation has not occurred. More information on Radon levels by region can be found at www.epa.gov/radon

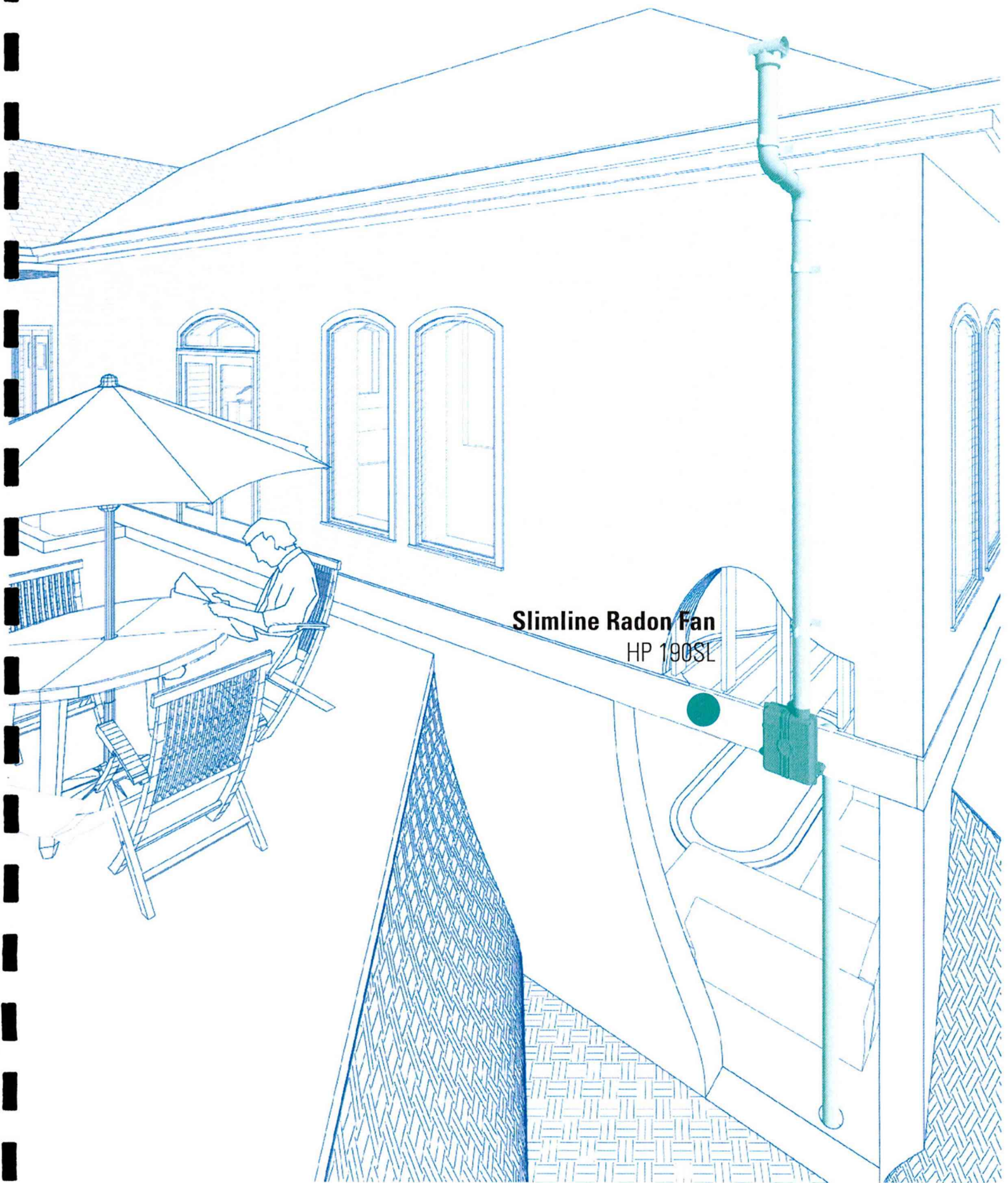
Testing is the only way to know if you and your family are at risk. Testing is easy and inexpensive; most hardware stores carry Radon Test Kits. The EPA recommends that you mitigate your home if the radon level is at or above 4 Picocuries per liter (4pCi/L).

The good news is that reducing the levels is not hard but requires the technical knowledge of a qualified mitigator. Check with your state Radon office for names of qualified or state certified radon contractors in your area. The most popular and common solution is to install a constantly running ventilation system, which pulls radon from beneath the house and extracts it to the outside. This system doesn't require a major change to your home. Sealing foundation cracks and other openings makes this kind of system more effective and cost-efficient.

Radon mitigation standards require that the fan to be placed outside of the living space of the home. In other words, anywhere that is outside the conditioned air space of the heating and air conditioning system. Garages, attics and exterior walls are all commonly acceptable locations for fan placement. The right system depends on the design of your home.

Over 30 years ago, Fantech pioneered the inline fan for Radon mitigation. Backed by a global organization with over 170 research and development engineers, you can trust Fantech to provide ventilation solutions designed for safety and comfort.





Slimline Radon Fan
HP 190SL

Top ten reasons to choose HP 190SL Slim Radon Fan

1. Only 5 inches deep

Low profile, wall-mount design minimizes installation time. Fan and discharge pipe are located on surface of exterior wall eliminating the need for two 45° elbows.

2. Electrical box condensate drain

Specifically designed to prevent moisture buildup from condensation.

Don't put your reputation at stake! For over 30 years, Fantech has manufactured quality ventilation equipment for Radon Applications. Fantech is the fan Radon contractors have turned to in over 1,000,000 successful Radon installations worldwide.

HP190SL

This radon fan is engineered specifically for the demanding environments of radon mitigation applications.



Model	Rated power	Voltage/phase	Max amps	Max. airflow	Max P _s	Weight	Item #
	W	V / ~	A	cfm	in.wg	lbs	
HP 190SL	88	120 / 1	0.78	159	2.14	12	40564

The performance curves shown in this brochure are representative of the actual test results recorded at Texas Engineering Experiment Station/Energy Systems Lab, a recognized testing authority for HVI. Testing was done in accordance with AMCA Standard 210-85 and HVI 916 Test Procedures.

Fan is attached to PVC pipe using flexible coupling. For 4" PVC pipe use Indiana Seals #156-44, Pipeconx PCX 56-44 or equivalent.

10. Conduit connection

Side conduit connection for easy installation and allows for an aesthetically pleasing placement.

9. Housing

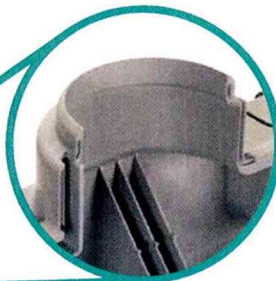
Manufactured from durable UV resistant polycarbonate - UL approved material for outdoor use. Factory sealed, no leak design. The unit's grey color closely matches the color of most electrical and other utility boxes.

8. Direct wall mount

Three integral vibration isolation mounts allow for stable installation in unique applications and provides quiet performance when in use.

3. Ice breaker

To protect the fan wheel in case of condensate freezing and hitting wheel, the ice breaker breaks apart falling ice.



4. Integral condensate bypass

Uniquely designed feature keeps moisture away from the motor. Condensation bypasses the motor compartment and drains out at the bottom of the unit.



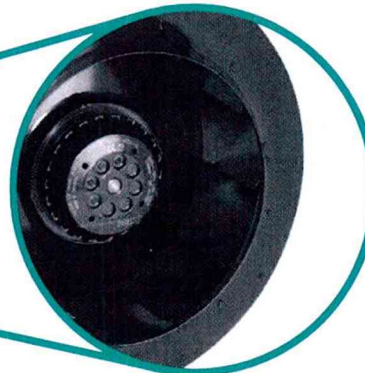
5. Terminal block

For easy wiring installation, the terminal block slides in (no screws). The rubber gasket around the terminal block compartment protects from moisture penetration.



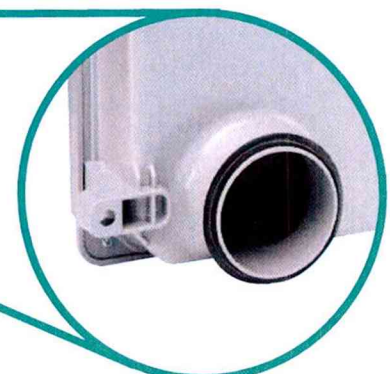
6. External rotor-motor

External rotor-motor with backward curved impeller is in airstream thus giving the fan best in class performance, reliability and longevity.



7. Inlet elbow

A built-in elbow allows for fan's direct connection to low pressure pipe opening on exterior wall. It eliminates the need for one 90° elbow and one coupling.



HP Series

Inline Radon Fans



HP 175 & HP 190

HP Series fans are specially designed with higher pressure capabilities for radon mitigation applications.

- UV resistant, UL Listed durable plastic
- UL Listed for use in commercial applications
- Watertight electrical terminal box
- Totally enclosed for protection
- Automatic reset thermal overload protection

HP175

The economical choice where slightly less air flow is needed. Often used where there is good sub slab communication and lower Radon levels.

HP190 and HP2190. The standard for Radon Mitigation.

Ideally optimized performance curve for a vast majority of your mitigations.

HP220

Excellent choice for systems with elevated radon levels, poor communication, multiple suction points and large subslab footprint

HP2133

For applications where lower pressure and flow are needed. Record low power consumption of 14-20 W! Often used where there is good sub slab communication and lower Radon levels.

Installations that will result in condensate forming in the outlet ducting should have a condensate bypass installed to route the condensate outside of the fan housing. Conditions that are likely to produce condensate include but are not limited to: outdoor installations in cold climates, long lengths of outlet ducting, high moisture content in soil and thin wall or aluminum outlet ducting. Failure to install a proper condensate bypass may void any warranty claims.

HP 220

HP 2133 & HP 2190

Specification data

Model	Rated power	Voltage / phase	Max. amps	0.0" P _s	0.5" P _s	0.75" P _s	1.0" P _s	1.25" P _s	1.5" P _s	1.75" P _s	2.0" P _s	Max P _s	Shipping weight	Item #
	W	V / ~	A	cfm								in.wvg	lbs	
HP 175	65	120 / 1	0.57	151	112	91	70	40	12	-	-	1.66	1	45047
HP 190	85	120 / 1	0.78	157	123	106	89	67	45	18	1	2.01	7	411297
HP 220	152	120 / 1	1.30	344	260	226	193	166	137	102	58	2.46	8	411349
HP 2133	20	120 / 1	0.17	134	68	19	-	-	-	-	-	0.84	1	45044
HP 2190	85	120 / 1	0.78	163	126	104	81	58	35	15	-	1.93	3	45048

The performance curves shown in this brochure are representative of the actual test results recorded at Texas Engineering Experiment Station/Energy Systems Lab, a recognized testing authority for HVI. Testing was done in accordance with AMCA Standard 210-85 and HVI 916 Test Procedures.

Fans are attached to PVC pipe using flexible couplings.

For 4" PVC pipe use Indiana Seals #156-44, Pipeconx PCX 56-44 or equivalent. For 3" PVC pipe use Indiana Seals #156-43, Pipeconx PCX 56-43 or equivalent.

HP 190

Radon Fan on exterior wall

Radon mitigation standards require that the fan to be placed outside of the living space of the home. In other words, anywhere that is outside the conditioned air space of the heating and air conditioning system. An exterior wall is a commonly acceptable location for fan placement.

HP 2133

Radon Fan in the attic

Sometimes it might seem impossible to find an aesthetically pleasing location on an exterior wall, so the attic can be an acceptable location for fan placement.

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