INTERIM REMEDIAL MEASURE REMEDIAL ACTION WORK PLAN

Vapor Intrusion Mitigation
142 State Street
Albany, New York

NYSDEC Site No. 401061
CHA Project Number: 21645

Prepared for:
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June 5, 2013

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CERTIFICATION

I, the undersigned, certify that I am currently a NYS registered professional engineer and that the Interim Remedial Measure - Remedial Action Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

For CHA:

John P. Sobiech, P.E.
Printed Name of Certifying Engineer

Signature of Certifying Engineer

06/07/13
Date of Certification

068973
Registration Number

New York
Registration State

CHA
Company

Partner
Title

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1.0 INTRODUCTION

This Remedial Action Work Plan (RAWP) has been prepared to describe the proposed Interim Remedial Measure (IRM) activities that will be implemented to mitigate vapor intrusion concerns at the property located at 142 State Street, in the City of Albany, NY (the Site). The 142 State Street property extends from State Street to Howard Street along the southeast side of Eagle Street and is currently developed with a largely vacant commercial high-rise building. This property is situated to the northwest of, and adjacent to, a previously documented New York State Department of Environmental Conservation (NYSDEC) designated Class 2 Inactive Hazardous Waste Disposal Site, identified as Former Albany Laboratories Site, NYSDEC Site No. 401061, at 67 Howard Street, Albany, NY.

Columbia Development Companies (Columbia), the owner of the Former Albany Laboratories Site, is currently in negotiations to acquire the property and building at 142 State Street, and renovation of the building is slated to occur in late 2013. To facilitate acquisition of the 142 State Street property, renovation of the building and progression of the Former Albany Laboratories Site toward the goal of NYSDEC's issuance of a Record of Decision (ROD) requiring no additional remedial action, Columbia intends to mitigate the identified SVI issues at the 142 State Street property through implementation of an IRM consisting of the installation and operation of a sub-slab depressurization system (SSDS) within the basement level of the building. Issuance of such a ROD will enable reclassification of the Site by NYSDEC from Class 2 to Class 4.

The Former Albany Laboratories Site, which is currently a vacant lot, was previously investigated by CHA and subsequently was the subject of an IRM for the removal of contaminated soil impacted by volatile organic compounds (VOCs). The extent of contaminated soil was confirmed and delineated as presented in a *Site Characterization Report* completed by CHA in August of 2010. The IRM was performed in accordance with the NYSDEC-approved IRM Work Plan dated January 5, 2011. The remedial activities undertaken during the IRM included removal of impacted soils from the area delineated under previous investigations, off-site disposal of impacted soils, confirmatory soil sampling following excavation and backfilling of the excavation with clean imported soil. IRM activities and confirmatory soil sampling results were documented in CHA's *Construction Completion Report*, dated October 3, 2011.

Based on the findings of the previous investigations and the IRM which entailed source removal of impacted soils, a Remedial Investigation (RI) was completed which focused on the potential

for soil vapor intrusion (SVI) into the building on the adjacent, off-site property at 142 State Street, and provided the necessary field data to delineate the nature and extent of potential SVI impacts to the building. The RI was performed in accordance with CHA's *Remedial Investigation Work Plan*, dated June 13, 2011. The data derived from the RI were utilized to facilitate an evaluation of the potential migration or possible future migration of soil vapor into the building, and provided the data necessary to develop remedial recommendations. The findings of the RI indicated the presence of VOCs in sub-slab vapor beneath the eastern portion of the building at levels requiring mitigation in accordance with the New York State Department of Health's (NYSDOH) *Guidance for Evaluating Soil Vapor Intrusion in the State of New York, October 2006*.

The following sections of this RAWP describe the proposed SSDS design and methods of installation.

2.0 INVESTIGATION AND TESTING RESULTS

2.1 DESIGN PROCESS

The sub-slab depressurization vapor mitigation system design involved collecting site-specific data to determine the most effective system components to be used, as well as installation and vapor extraction locations. This data was collected via on-site diagnostic pressure testing and building inspections conducted by CHA in conjunction with our subcontractor, Alpine Environmental Services Inc. (Alpine). Based on discussions with representatives of the NYSDEC and NYSDOH, the area to be influenced by the SSDS includes the entire building footprint.

The pressure diagnostic testing (also referred to as pressure field extension testing) allows for determination of the most appropriate in-line fan for the site-specific soil characteristics, as well as the sub-slab pressure gradient. On-site diagnostic testing is considered the most accurate way to determine the pressure field extension radius when retrofitting an existing building with a SSDS system, particularly when the gradation and consistency of the sub-slab materials is unknown. Additionally, placement locations of horizontal and vertical piping components were evaluated based on the collected site data and input of the owner/owner's representative (i.e. planned tenant usage, etc.).

The proposed SSDS layout has been prepared by Alpine and is included as Figures 2 through Figure 4 (attached), based on the results of sub-slab diagnostic pressure testing. The sub-slab depressurization vapor mitigation system was designed in accordance with applicable USEPA and American Society of Testing and Materials Guidance Documents.

2.2 PERFORMANCE CRITERIA

The sub-slab depressurization system for vapor mitigation is designed to create a constant and continuous negative pressure of the sub-slab air with respect to the room air in selected areas of the footprint of the building. The system is designed to achieve the performance criteria of sub-slab negative pressures of greater than or equal to 0.002 inches of water column. This result is demonstrated by testing the sub-slab to room pressure differential utilizing a digital micro-manometer and ½-inch diameter test holes at representative locations, as further described in

Section 4 of this document.

2.3 PRE-DESIGN DIAGNOSTIC TESTING

On May 2 and 3, 2013, sub-slab pressure gradient testing was performed to determine the appropriate fan type(s) and size(s) for effective system operation with the existing site conditions. The site-specific testing allows the technician to test the system with different fans and select a fan size that optimizes the pressure gradient with the fan flow rate and energy usage.

The data collection involved coring a total of five, 5-inch diameter and numerous ½-inch diameter holes through the concrete floor slab to run a series of pressure tests to characterize the permeability of the sub-slab material. The 5-inch diameter holes were utilized as vacuum extraction points with various commercially available fans. The ½-inch diameter holes were utilized as monitoring points to measure the pressure/vacuum at various distances away from the extraction point using a digital micro-manometer to verify acceptable pressure field extension for the specified fan.

2.4 RESULTS OF DIAGNOSTIC TESTING

Results of the diagnostic pressure testing and layout verification activities were utilized to determine the following:

- Fan/blower to be used in each system/sub-system.
- The size of system components (i.e. pipe diameter, etc.).
- Extraction point location; horizontal pipe run locations; fan/blower mounting positions.
- Monitoring panel locations.
- Identification of possible conflicts.

The results of sub-slab pressure diagnostic testing are presented in tabular format on Figure 4. Sub-slab conditions were observed to be variable. Each test location had different sub-slab fill materials at varying compaction levels. One of the extraction points, EP2, was located over a sub-slab cavity. Concrete slab thickness in the test areas varied greatly, from approximately 4 inches to 14 inches. In some areas, evidence was observed of backfill over an old concrete floor with a newer floor slab installed over the fill material.

The sub-slab testing at extraction point EP2 identified a cavity under the concrete floor, approximately 8 inches deep and extending out in all directions. Pipes (presumed to be sewer lines), one of which appears to have a portion removed (uncapped), were observed from the hole cored through the concrete slab. Based on observations made during the drilling of test points around EP2, it appears that several of these points are also located over the cavity. A pressure test performed on the cavity was successful in extending coverage an acceptable distance; however, a large flow rate was extracted from the cavity during the test and the discharge had strong sewer-type odors. It could not be determined if the pipes observed from the opening at EP2 were sewer lines, were active/inactive, or were the source of the sewer-type odors. Additional investigation is required to determine the nature of these pipes and the extent of the sub-slab cavity. Following testing, the extraction point EP2 was sealed with a plastic cover and silicone caulk to facilitate further investigation in the future.

Also of interest, pressure testing results in the area of extraction point EP5 were variable. A second concrete floor slab was observed below the existing floor slab, separated by a few inches of fill material. The second floor slab was penetrated as part of the testing process. In the area of extraction point EP5, the space between the two floor slabs was observed to vary between zero and several inches. This condition may require additional sub-slab drilling and diagnostic testing to fully delineate the area where this condition exists; however, the area where this condition was observed appears to be relatively small, so the SSDS for this area has been designed with a conservatively estimated pressure field extension. Minor changes in extraction point placement and number may be necessary during the installation, but the additional effort and materials for the adjustments are expected to be minimal.

3.0 SUB-SLAB DEPRESSURIZATION SYSTEM DESIGN

3.1 GENERAL

The SSDS is designed to be comprised of seven sub-systems, each of which will have a system fan and distinct exhaust stack. The system can be operated in its entirety or in any combination of sub-systems, thus enabling certain sub-systems to be shut down over time, as conditions allow.

Prior to the installation of the SSDS, the Owner will be consulted for the most recent planned layout of the basement. That layout will then be checked against the current SSDS layout design to determine and evaluate potential conflicts. Any identified conflicts will be resolved prior to installation of the system, and any changes made that actually impact the system layout/configuration as designed will be presented to NYSDEC/NYSDOH for approval prior to installation.

3.2 PIPING AND EXTRACTION POINTS

The vapor mitigation system piping and extraction points will be installed according to the following procedures:

- A 5-inch diameter hole will be cored through the concrete at each extraction point. The overall system design includes nineteen (19) extraction points to provide full pressure field extension across the building footprint (additional extraction points will be added, if needed, to address non-homogeneous conditions and to achieve the performance criteria identified in Section 2.2). Each extraction point sub-slab cavity will have soils removed up to 1/2 cubic foot (if practical).

- Piping entering extraction points will be sealed into the concrete floor slab with a floor flange and sealed air tight with polyurethane caulk or concrete.

- Piping and fittings for sub-systems 1, 2, 4, 5, 6, and 7 will be constructed of 3-inch diameter Schedule 40 polyvinyl chloride (PVC). Piping and fittings for sub-system 3 will be constructed of 4-inch diameter Schedule 40 PVC. All Schedule 40 PVC pipe will be manufactured from a Type I, Grade I PVC compound with a cell classification of 12454 per ASTM D1784. The pipe will be manufactured in compliance to ASTM D1785 and D2665. All hard PVC joined pipes will be solvent welded with heavy duty PVC cement.

- The fans will be connected to the suction and discharge piping using flexible rubber couplings (e.g. Fernco couplings).

- A hanger will secure horizontal pipe runs at least every 6 feet and vertical pipe runs at

least every 8 feet.

- No water traps will be created in any vapor mitigation system pipe.
- All system piping will be installed to allow in-pipe condensation to drain back to an extraction point (sloped towards the extraction point).
- Fire collars and/or fire-rated putty will be used on all firewall penetrations.
- The existing building at the subject property is approximately 12 stories high. Fan mounting locations are to be at the roof level. Sub-system piping will rise to the roof area through an existing chase, indicated on Figure 2. The chase has been determined to be accessible on each floor of the building, but will require demolition of drywall covering the chase. The Owner/Owner's Representative will be consulted for determination of an acceptable pathway from the chase to the outside of the building where the fans will be mounted. Any suspect asbestos-containing materials (ACMs) identified in the chase will be tested and abated as necessary prior to the installation of the extraction piping by an appropriate certified contractor (not the SSDS installer).
- A PVC ball valve will be installed in each extraction point pipe to allow for system balancing, except where limiting factors prohibit the use of valves. Valves will be installed in a vertical position. System valves will be 3-inch or 4-inch PVC ball valves acceptable for airtight solvent weld to Schedule 40 PVC pipe. Valve diameter will not be smaller diameter than the extraction point it controls.

3.3 PATHWAY SEALING

During the sub-slab diagnostic pressure testing, significant air leakage into floor cracks (i.e. short circuiting) was not observed. During installation of the SSDS, any floor penetration observed to be significantly contributing to short circuiting will be sealed air tight with polyurethane caulk for penetrations 5/8-inch wide or less, and with backer rod and self-leveling polyurethane caulk for openings larger than 5/8-inch.

3.4 SYSTEM FANS

Each sub-system will include a fan which will be installed to induce a vacuum beneath the basement floor slab, and thus, induce a pressure gradient between the sub-slab of the building and the interior space. The fan specified for sub-systems 1, 2, 4, 5, 6 and 7 is model GBR76HO, manufactured by Obar Systems Inc. (or equivalent). The fan specified for sub-system 3 is model RP265, manufactured by RadonAway™, Inc. (or equivalent). Fans will include manufacturers' standard warranty of 18 months for Obar Systems GBR fans and 5 years for RadonAway RP series fans. Manufacturer cut sheets for the fans are included in Appendix B. Fans will be

mounted either on the exterior wall of the penthouse or on the roof of the penthouse, as depicted on Figure 3. All fans will be installed in accordance with the manufacturers' installation instructions.

It is currently anticipated that prior to installation of the SSDS, the floor slab in the area of extraction point EP2 will be cut out to investigate the sub-slab cavity and pipes identified in this area during pre-design testing. Following the abandonment and/or repair of any pipes beneath the concrete slab, the cavity will be backfilled using a combination of No.1 and No.2 crushed stone (50:50 mix) beneath the new section of floor slab, and sub-system 3 will utilize the same type of fan as the other sub-systems.

3.5 SYSTEM EXHAUST

Exhaust piping will be installed as follows:

- All exhaust pipes will be installed to a termination point no less than 12 inches above the main roof, if exhaust piping penetrates the roof, or a minimum of main roof height if exhaust piping is adjacent to the roof.
- All exhaust pipes will be fitted with a protective screen or cover to reduce the potential for water and vector intrusion.
- All system exhaust termination points will be at the roof level of the building and be a minimum of 20 feet away from any intakes or openings, or 10 feet away if the exhaust is a minimum of two feet above the opening.

3.6 SYSTEM MONITORING

Equipment/instrumentation will be installed as follows in order to monitor the function and performance of the SSDS:

- Monitoring panels will be installed to monitor the real time differential pressure in each sub-system.
- The post-installation static differential pressure reading of each sub-system will be recorded on the pressure panel using a real time mechanical Magnehelic® manometer, as manufactured by Dwyer Instruments, Inc., or equal. The instrument will have an operational range of 0 to 50 inches of water column. A cut sheet for the Dwyer Instruments, Inc. manometer has been included in Appendix B.

- A visual low pressure alarm will be installed at the monitoring panel. The alarm will be activated when the pressure in the SSDS falls to or below 0.25 inches of water column.

- An adjustable differential pressure switch (dry contact, double pole) will be installed on each sub-system and available for connection to the building alarm/monitoring system.

3.7 SYSTEM LABELING

Vapor mitigation system piping and components will be clearly labeled as follows to facilitate accurate identification for operation, maintenance and monitoring purposes:

- Extraction lines will be labeled with permanent stick-on labels. Labels will correspond to as-built drawing extraction point identification.

- Pressure meters, monitoring panel alarms and switches will be labeled with permanent labels indicating the system components being monitored, and corresponding to as-built drawing labels.

- Piping will be labeled at least once per room and at least once on every floor. Label will read "Vapor Mitigation System" and will be readable from a distance of 3 feet away.

- Electrical circuit breakers will be labeled "Vapor Mitigation Fan #" (# will be replaced by the corresponding sub-system, as shown on Figures 2).

3.8 ELECTRICAL SERVICE

Electrical service and connection work associated with the electrical components of the SSDS will be conducted as follows:

- Electrical connection of all electrical components will comply with local electrical code.

- Each fan will include an electrical disconnect within 6 feet of the fan mounting location. An electrical receptacle with a weather tight cover for a plug-in type fan is an acceptable disconnect to satisfy this requirement.

- A valid electrical permit will be obtained from the appropriate City of Albany and/or Albany County.

- All electrical connection work will be performed by a qualified electrician, licensed to perform electrical work in Albany County, New York and the local municipality (if applicable).

- Electrical inspection will be obtained by the SSDS installer and all necessary conditions will be met to obtain satisfactory inspection and permit closing.
- Fan electrical connection will comply with manufacturer requirements.
- System electric service will be connected to the existing building electric system.
- All electrical materials used in the installation of the vapor mitigation system will comply with local Electrical Code.

3.9 ENCLOSURES

Each fan will include a weather tight enclosure suitable for installation on top of the existing building. Enclosures around installed piping are not included in the design. It is anticipated that the SSDS will be installed prior to renovations of the building and any enclosure construction will be completed as part of the renovations.

4.0 POST INSTALLATION TESTING AND SYSTEM BALANCING

4.1 POST-INSTALLATION TESTING

Following the installation of the SSDS, the following testing will be performed to verify that the SSDS system is operating optimally:

- Verification that the system fans are operating within manufacturer's specifications (i.e. not exceeding maximum operating pressure, etc.). If not, the fan selection will be modified and a new fan will be installed.

- Verification that system switches and gauges are operating correctly by turning off system fans and observing results.

- Performance of sub-slab to room differential pressure testing using a digital micro-manometer to verify pressure field extension throughout the area of influence.

- Test locations will be selected in a manner sufficient to demonstrate sufficient negative pressure field extension.

- The SSDS will be considered to be operating effectively when the minimum sub-slab to room differential pressure of -0.002 inches of water column can be continuously demonstrated throughout the area requiring mitigation.

- All pressure test holes will be permanently sealed airtight (i.e. patching of the concrete slab) following demonstration of compliance with the performance criteria.

4.2 SYSTEM BALANCING

As previously indicated, ball valves will be installed on the sub-slab extraction piping. Sub-slab extraction line valves will be adjusted as necessary to balance sub-slab pressure field extension to cover the prescribed area of influence. Additional extraction points will be installed as needed to provide necessary pressure field extension to cover the prescribed area of influence.

5.0 MONITORING

Once the SSDS is in full operation, the system will be inspected annually to evaluate the condition of system components (and repair or replace as necessary) and to confirm proper operation of the system. Operations and maintenance procedures will be included as part of the Construction Completion Report, as described in Section 7.0 of this document.

In addition to the annual inspection as described above, sub-slab vapor and indoor air quality testing will be performed periodically to verify successful operation of the system as well as facilitate an evaluation for the potential future shutdown of one or more of the SSDS sub-systems. Such testing will be performed at the following times:

1. Approximately two weeks following system installation and startup.
2. At least one year following the system installation and during the heating season.
3. Once every five years following the post-installation sampling events, during heating season, to verify continued effectiveness of the vapor mitigation systems.
4. Prior to evaluating the potential shutdown of one or more of the SSDS systems.

Prior to each sampling event, CHA will notify the NYSDEC and NYSDOH of the event and the intended sampling locations. Sub-slab vapor and indoor air samples will be collected using Summa canisters and will be submitted to a NYSDOH-approved, Environmental Laboratory Approval Program (ELAP)-certified laboratory to be analyzed for volatile organic compounds by EPA Method TO-15. The existing network of three sub-slab monitoring points will be utilized for the sub-slab vapor samples.

6.0 HEALTH AND SAFETY PROTOCOL

The assignments associated with this project require CHA employees to perform tasks where personal safety could be compromised due to chemical, physical, and biological hazards. While conducting fieldwork, CHA employees may be exposed to chemical contaminants including a wide variety of organic compounds. Additionally, CHA employees may be exposed to physical hazards, including but not limited to, hammer drill use, bending/lifting, and trip/fall hazards.

A Site Health & Safety Plan (HASP) has been prepared for the use of CHA and its employees. The requirements and guidelines in the HASP are based on a review of available information and an evaluation of potential on-site hazards from previous studies and information available to date.

This HASP will be discussed with site personnel and will be available on-site for review while work is underway. All personnel conducting site activities must be familiar with the procedures, requirements and provision of this plan, and in the event of conflicting plans/requirements, personnel must implement those safety practices which afford the highest level of protection. CHA's Field Team Leader will also serve as CHA's Health and Safety Coordinator and is responsible for implementation of this HASP into daily site activities. A copy of the Site Health and Safety Plan is included in Appendix A.

The contractor installing the SSDS will prepare their own site-specific HASP for their work, which will address health and safety relative to the use of specific tools and equipment they will utilize to complete the installation of the SSDS systems as well as electrical safety when connecting the fans to a power source. Since the building being mitigated as part of this project is not a listed hazardous waste site and the project does not involve the handling of grossly-contaminated soils, on-site workers are not required to have 40-Hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training in accordance with 29 CFR 1910.120.

7.0 CONSTRUCTION COMPLETION REPORT

Subsequent to the installation of the SSDS and post-installation system testing, CHA will prepare a Construction Completion Report. The report will include the following:

- A written description of the systems installed, including make/model of fans, fan serial numbers, system fan manufacturing dates.
- As-built drawing of the location of fans, system piping, gauges, valves, alarms, etc.
- A chart indicating the pressure, airflow and valve position in each sub-slab extraction line and the pressure and airflow in each exhaust stack.
- Manufacturer paperwork (including warranty paperwork, operational manuals, etc.) for all fans, meters, alarms, and switches installed.
- Photographs with description of system components.
- Post-installation sub-slab pressure test data on a drawing indicating test locations demonstrating that the system meets or exceeds the performance criteria.
- Operations and maintenance procedures, including criteria for evaluating the proper operation of the systems and a timeline for annual inspection of the systems.

8.0 SCHEDULE AND ESTIMATED COST

8.1 SCHEDULE

IRM activities will commence within approximately two to three weeks following agency approval. Abatement of previously identified asbestos containing materials (ACM) in certain portions of the building will be required to facilitate installation of the SSDS. It is anticipated that installation of the SSDS will be completed within two to four weeks following completion of ACM abatement.

8.2 ESTIMATED COST

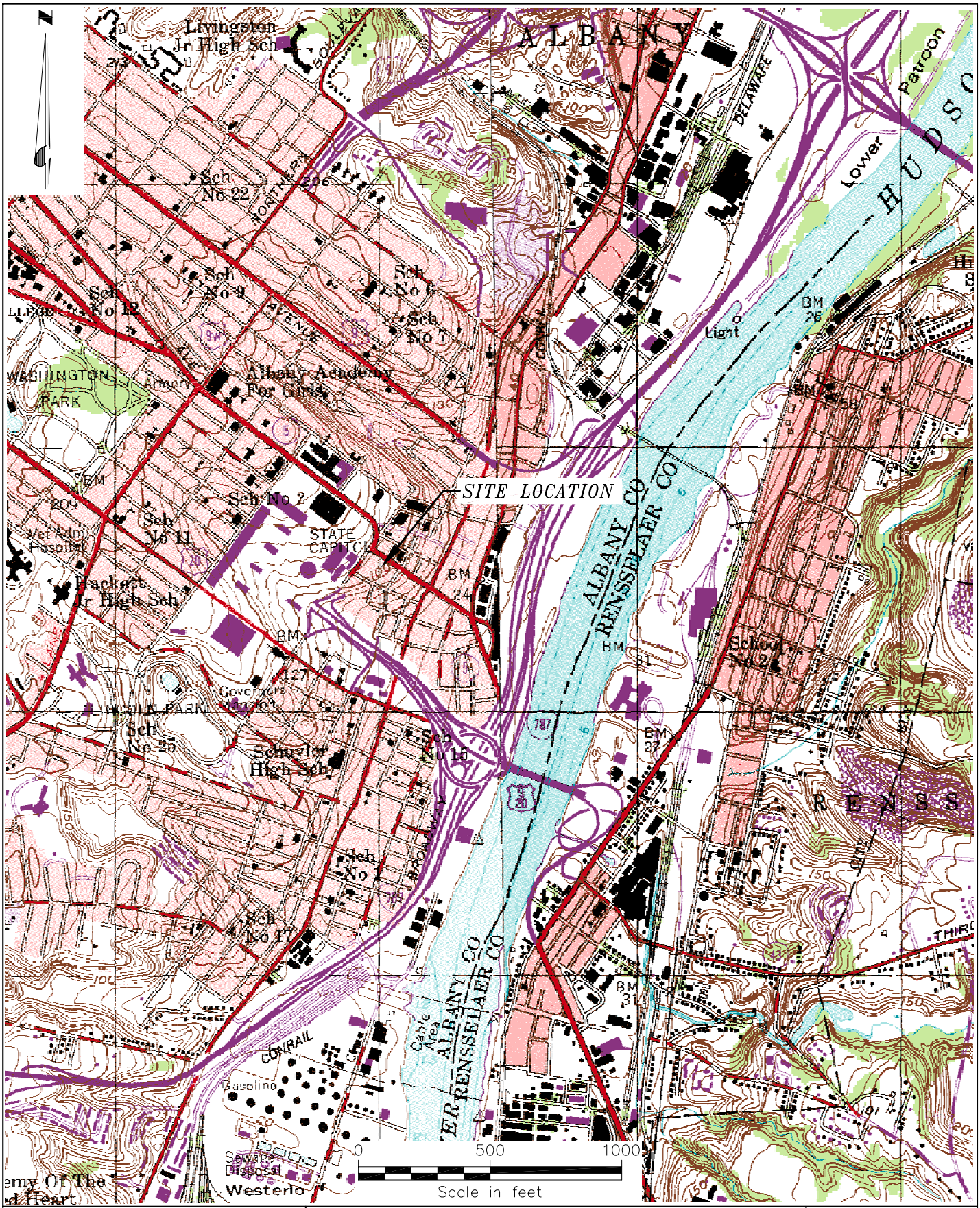
The cost for installation and initial start-up of the SSDS, as presented in this RAWP, is estimated to range from $150,000 to $200,000 and does not include the cost of asbestos removal necessary to install the SSDS.

9.0 FUTURE SITE DEVELOPMENT

In the event that renovations of the 142 State Street building include the removal and replacement of significant portions of the basement floor slab subsequent to installation of the SSDS as currently designed, the potential effects on system operation will be evaluated. Based on field conditions observed during the course of floor slab removal (e.g. presence of additional sub-slab cavities/voids, type of sub-slab material), modifications to the system may be made. These modifications may include, but not be limited to, altering of the fan model(s), and addition, relocation or elimination of vapor extraction points, particularly in the event that additional sub-slab cavities/voids are identified that require filling prior to installation of a new floor slab. Cavities/voids will be filled in using a mix of washed No.1 and No.2 crushed stone or imported material similar to observed surrounding sub-slab material. In addition, any foundation wall penetrations as a result of renovation activities will be thoroughly sealed. Field verification testing will be performed to confirm that the SSDS continues to meet the established performance criteria.

Based on the subsurface investigation and remedial activities which have been conducted at the Former Albany Laboratories Site (currently a vacant lot), and the current conditions which have raised concerns regarding vapor intrusion into the adjacent building at 142 State Street, it is anticipated that a vapor mitigation system will be incorporated into the design of any future habitable building to be constructed on the Former Albany Laboratories Site as well.

FIGURES



CHA
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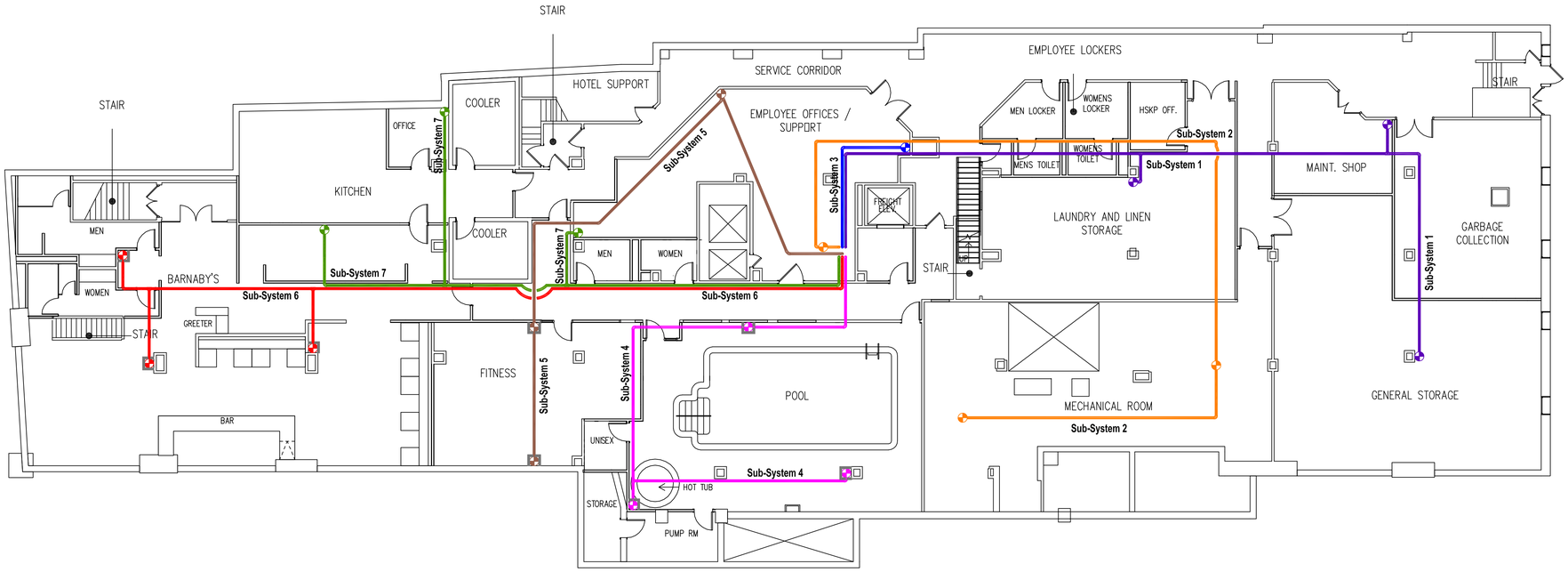
SITE LOCATION MAP

67 HOWARD STREET SITE
ALBANY, NEW YORK

PROJECT NO. 21645

DATE: 07/09/10

FIGURE 1



LEGEND

- Extraction Point
- Extraction Point in Enclosure
- Extraction Piping Riser to Fan on Roof
- **Sub-System 1** — Extraction Piping - Sub-System 1 3-Inch Schedule 40 PVC Pipe.
- **Sub-System 2** — Extraction Piping - Sub-System 2 3-Inch Schedule 40 PVC Pipe.
- **Sub-System 3** — Extraction Piping - Sub-System 3 4-Inch Schedule 40 PVC Pipe.
- **Sub-System 4** — Extraction Piping - Sub-System 4 3-Inch Schedule 40 PVC Pipe.
- **Sub-System 5** — Extraction Piping - Sub-System 5 3-Inch Schedule 40 PVC Pipe.
- **Sub-System 6** — Extraction Piping - Sub-System 6 3-Inch Schedule 40 PVC Pipe.
- **Sub-System 7** — Extraction Piping - Sub-System 7 3-Inch Schedule 40 PVC Pipe.

NOTES:

PIPING FOR SUB-SYSTEMS 1, 2, 4, 5, 6, 7 IS TO BE 3-INCH INNER DIAMETER SCHEDULE 40 PVC PIPING.

PIPING FOR SUB-SYSTEM 4 IS TO BE 4-INCH INNER DIAMETER SCHEDULE 40 PVC PIPING.

LAYOUT OF THE VAPOR EXTRACTION SUB-SYSTEMS IS BASED ON THE PLANNED NEW LAYOUT OF THE SPACE.

ELECTRICAL WIRING AND HOOKUP SHALL BE PERFORMED BY OTHERS.

SCALE IN FEET

0 5 10 20 25 30 40 50

PROJECT NORTH

Alpine ENVIRONMENTAL SERVICES
1146 CENTRAL AVENUE
ALBANY, NEW YORK 12205
(518) 453-0146

PROJECT TITLE

Former **ALBANY LABORATORIES** SITE

ALBANY, NY

SHEET TITLE

SYSTEM COMPONENTS SUB-SYSTEMS 1 - 7

DRAWN BY | CHECKED BY

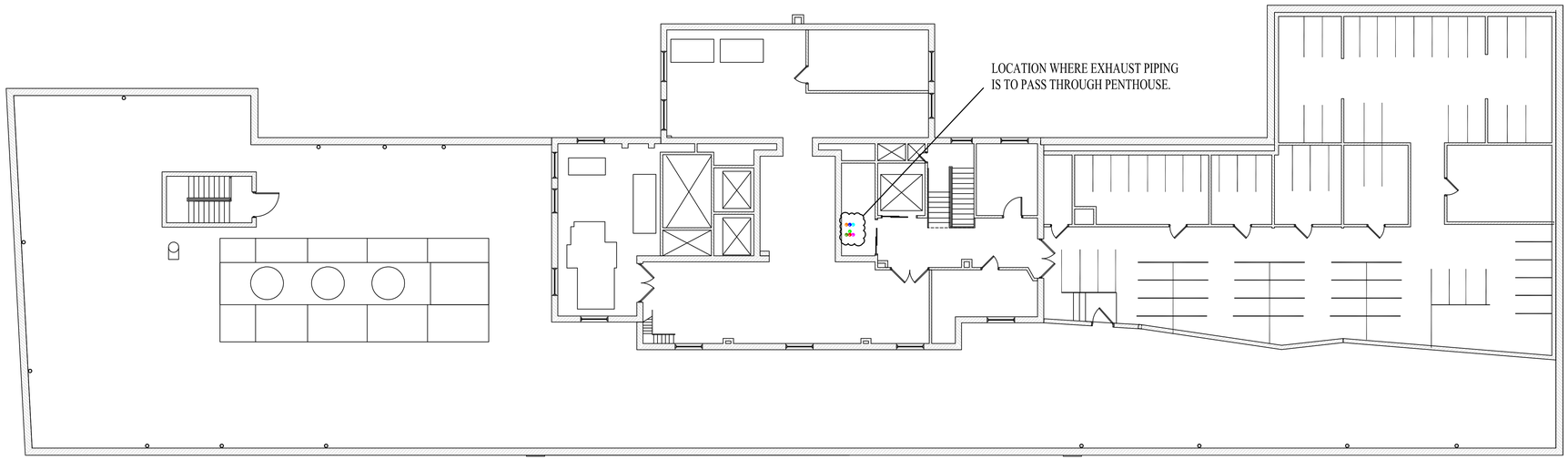
SUBMISSION DATE

PROJECT NO.

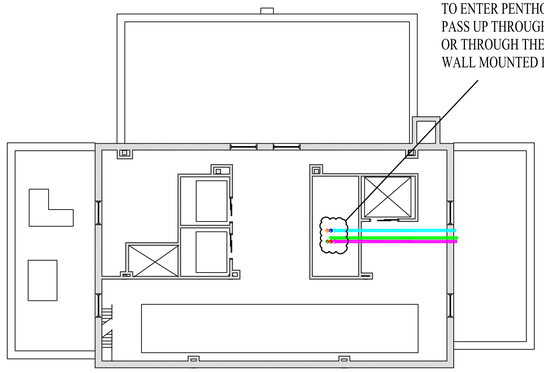
REVISIONS

SHEET NO.

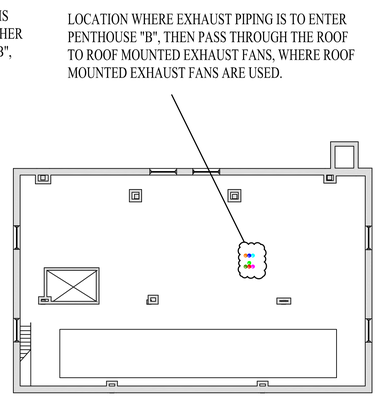
Figure 2



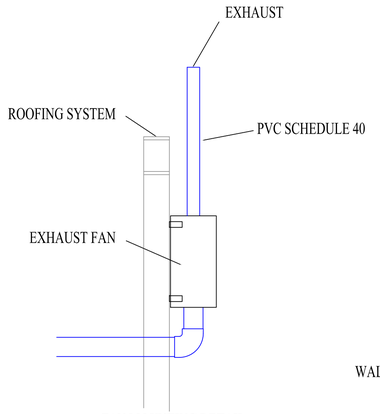
1 PENTHOUSE



2 PENTHOUSE A

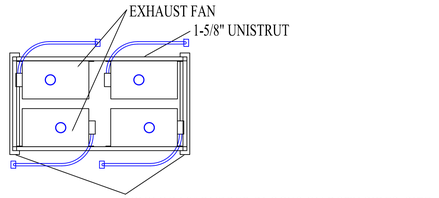


3 PENTHOUSE B

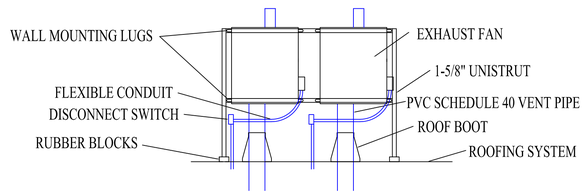


FAN MOUNTING DETAIL
WALL MOUNT - SIDE VIEW
NOT TO SCALE

NOTES:
1. CONFIGURE UNISTRUT ASSEMBLY AS NEEDED TO ACCOMMODATE INSTALLED EXHAUST VENT STACK LOCATION.



EXHAUST FAN ROOF MOUNTING DETAIL - TOP VIEW
NOT TO SCALE



EXHAUST FAN ROOF MOUNTING DETAIL - FRONT VIEW
NOT TO SCALE

SCALE IN FEET

0 5 10 20 25 30 40 50

PROJECT NORTH

Alpine ENVIRONMENTAL SERVICES
1146 CENTRAL AVENUE
ALBANY, NEW YORK 12205
(518) 453-0146

PROJECT TITLE

Former
ALBANY LABORATORIES
SITE

ALBANY, NY

SHEET TITLE

PENTHOUSE PIPING
AND
EXHAUST FAN
MOUNTING DETAILS

DRAWN BY | CHECKED BY

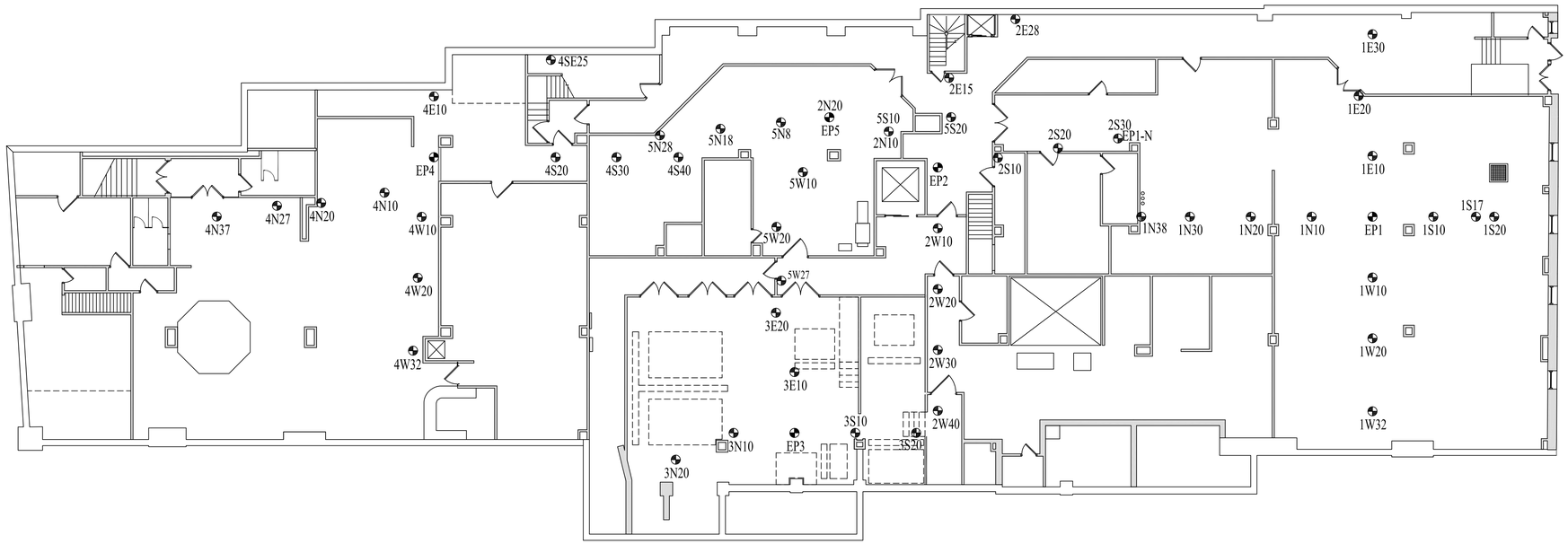
SUBMISSION DATE

PROJECT NO.

REVISIONS

SHEET NO.

Figure 3



EP-1

TEST POINT	FAN					
	GP 501	HS 2000	HS 5000	GBR HO	Vac 6HP	NO FAN
STATIC	4.0" wc	14.0" wc	17.0" wc	23.0" wc	26.0" wc	NA
1N10	-0.133" wc	-0.403" wc	-0.653" wc	-0.676" wc	-0.744" wc	0.0" wc
1N20	-0.004" wc	-0.014" wc	-0.024" wc	-0.025" wc	-0.028" wc	0.0" wc
1N30	-0.002" wc	-0.007" wc	-0.011" wc	-0.011" wc	-0.012" wc	0.0" wc
1N38	-0.001" wc	-0.003" wc	-0.005" wc	-0.006" wc	-0.006" wc	0.0" wc
EP1-N	0.0" wc	-0.003" wc	-0.006" wc	-0.006" wc	-0.007" wc	0.0" wc
1S10	-0.044" wc	-0.142" wc	-0.240" wc	-0.243" wc	-0.267" wc	-0.001" wc
1S17	-0.013" wc	-0.035" wc	-0.058" wc	-0.059" wc	-0.064" wc	-0.002" wc
1S20	-0.007" wc	-0.016" wc	-0.025" wc	-0.027" wc	-0.029" wc	-0.002" wc
1E10	-0.023" wc	-0.079" wc	-0.135" wc	-0.138" wc	-0.151" wc	0.0" wc
1E20	-0.014" wc	-0.045" wc	-0.077" wc	-0.079" wc	-0.085" wc	-0.002" wc
1E30	-0.009" wc	-0.024" wc	-0.038" wc	-0.040" wc	-0.043" wc	-0.003" wc
1W10	-0.082" wc	-0.250" wc	-0.417" wc	-0.424" wc	-0.462" wc	0.0" wc
1W20	-0.024" wc	-0.071" wc	-0.116" wc	-0.118" wc	-0.127" wc	-0.001" wc
1W32	-0.012" wc	-0.030" wc	-0.047" wc	-0.048" wc	-0.048" wc	-0.003" wc

EP-2

TEST POINT	FAN		
	GP 501	RP 265	NO FAN
STATIC	0.30" wc	2.0" wc	NA
2N10	0.0" wc	-0.004" wc	0.0" wc
2N20	0.0" wc	-0.003" wc	0.0" wc
2S10	-0.001" wc	-0.005" wc	+0.001" wc
2S20	0.0" wc	-0.005" wc	0.0" wc
2S30	0.0" wc	-0.002" wc	0.0" wc
2E15	0.0" wc	-0.005" wc	0.0" wc
2E28	0.0" wc	-0.005" wc	0.0" wc
2W10	0.0" wc	-0.005" wc	0.0" wc
2W20	0.0" wc	-0.003" wc	+0.001" wc
2W30	0.0" wc	0.0" wc	0.0" wc
2W40	0.0" wc	0.0" wc	0.0" wc

EP-3

TEST POINT	FAN						
	GP 501	GBR HO	GBR HO	GBR HO	GBR HO	HS 2000	NO FAN
STATIC	4.0" wc	30" wc	4.2" wc	32" wc	14.1" wc	14.1" wc	NA
3N10	-0.018" wc	-0.130" wc	-0.020" wc	-0.147" wc	-0.072" wc	-0.056" wc	0.0" wc
3N20	0.0" wc	-0.010" wc	0.0" wc	-0.012" wc	-0.005" wc	-0.002" wc	0.0" wc
3S10	-0.040" wc	-0.252" wc	-0.043" wc	-0.281" wc	-0.142" wc	-0.136" wc	0.0" wc
3S20	0.0" wc	-0.002" wc	0.0" wc	-0.002" wc	-0.001" wc	0.0" wc	0.0" wc
3E10	-0.068" wc	-0.554" wc	-0.073" wc	-0.627" wc	-0.290" wc	-0.284" wc	+0.001" wc
3E20	0.0" wc	-0.003" wc	0.0" wc	-0.004" wc	0.0" wc	0.0" wc	0.0" wc

EP-4

TEST POINT	FAN		
	GP 501	RP 265	GBR HO
STATIC	1.1" wc	2.06" wc	3.1" wc
4N10	-0.038" wc	-0.063" wc	-0.075" wc
4N20	-0.015" wc	-0.024" wc	-0.028" wc
4N27	-0.002" wc	-0.004" wc	-0.004" wc
4N37	0.0" wc	-0.001" wc	-0.001" wc
4S20	-0.002" wc	-0.002" wc	-0.002" wc
4SE25	-0.001" wc	-0.003" wc	-0.001" wc
4S30	0.0" wc	-0.001" wc	-0.001" wc
4S40	Not Tested	0.0" wc	-0.001" wc
4E10	-0.003" wc	-0.005" wc	-0.005" wc
4W10	-0.017" wc	-0.028" wc	-0.034" wc
4W20	-0.003" wc	-0.004" wc	-0.005" wc
4W32	+0.001" wc	-0.002" wc	-0.002" wc

EP-5

TEST POINT	FAN	
		GBR HO
STATIC	7.7" wc	6.2" wc
5N8	-0.324" wc	-0.279" wc
5N18	0.0" wc	0.0" wc
5N28	0.0" wc	Not Tested
5S10	-0.016" wc	-0.013" wc
CHA20	0.0" wc	0.0" wc
5W10	0.0" wc	0.0" wc
5W20	0.0" wc	0.0" wc
5W27	0.0" wc	Not Tested

SCALE IN FEET

0 5 10 20 25 30 40 50

PROJECT NORTH

Alpine Inc.
ENVIRONMENTAL SERVICES
1146 CENTRAL AVENUE
ALBANY, NEW YORK 12205
(518) 453-0146

PROJECT TITLE

Former
ALBANY LABORATORIES
SITE

ALBANY, NY

SHEET TITLE

DIAGNOSTIC DIFFERENTIAL PRESSURE TESTING RESULTS

DRAWN BY | CHECKED BY

SUBMISSION DATE

PROJECT NO.

REVISIONS

SHEET NO.

Figure 4

APPENDIX A

Health and Safety Plan

CLOUGH HARBOUR & ASSOCIATES LLP

SITE HEALTH AND SAFETY PLAN

PROJECT INFORMATION

Project Name: Former Albany Laboratories Site	**CHA Project No.** 21645
Project Start Date: 6/15/13 **Completion Date:** 9/30/13	**Weather:**
Project Location: 142 State Street, Albany, NY	**Project Task:** Install Sub-Slab Depressurization System *Complete a Site Health & Safety Plan per Task*

Description of Work: Installation of sub-slab depressurization system, including approximately 20 extraction points and associated PVC piping and exhaust fans.
Be Specific:

Key Personnel:	Seth Fowler	Seth Fowler	Scott Rosecrans
Responsibilities:	*Project Manager*	*Field Team Leader*	*Site Safety Officer*

Description of Hazards: The hazards associated with this work are largely limited to the installation of the extraction points which require coring/drilling of the floor slab. The hazards associated with this are electrical due to the electric core drill, mechanical due to the active drill bit and potential for flying debris, and the generation of dust.

TASK HAZARDS				TASK SAFETY MEASURES & PPE	
Eye	Chemical Exposure	Yes ☐	No ☒	☒ Safety Glasses	
	High Heat/Cold	Yes ☐	No ☒	☐ Safety Goggles	
	Dust/Flying Debris	Yes ☒	No ☐	☐ Face Shield	
	Impact	Yes ☐	No ☒	☐ Shaded Lenses	
	Light/Radiation	Yes ☐	No ☒		
Head	Impact	Yes ☐	No ☒	☐ Hard Hat: ☐ Orange or ☐ White or ☐ Blue	
	Electrical Shock	Yes ☐	No ☒	☐ Reflector Tape (Required for night operations)	
	Lack of Visibility	Yes ☐	No ☒		
Foot	Chemical Exposure	Yes ☐	No ☒	☒ Work Boots	☐ Steel Toed Boots
	High Heat/Cold	Yes ☐	No ☒	☐ Ankle Protection	☐ I/75 C/75 (Impact/Compression)
	Impact/Compression	Yes ☐	No ☒	☐ Rubber Boots	☐ Cd Type 1 or 2 (Conductive)
	Slips/Trips	Yes ☒	No ☐	☐ Insulated Boots	☐ PR (Puncture Resistant)
	Puncture	Yes ☒	No ☐	☐ Non-slip Soles	☐ Mt/70 or 50 or 30 (Metatarsal)
	Slippery/Wet Surface	Yes ☐	No ☒	☐ Chemical resistant	☐ EH (Electrical Hazard)
	Explosive/Flammable Atmospheres	Yes ☐	No ☒		☐ SD Type I or II (Static Dissipative)
	Electrical	Yes ☒	No ☐		
Hand	Chemical Exposure	Yes ☐	No ☒	☒ Work Gloves	☐ Rubber Gloves
	High Heat or Cold	Yes ☒	No ☐	☒ Leather Gloves	☐ Nitrile Gloves
	Cuts/Abrasion	Yes ☒	No ☐	☒ Latex Gloves	☐ Insulated Gloves
	Puncture	Yes ☒	No ☐	☐ Vinyl Gloves	☐ Metal Mesh Gloves
	Electrical Shock	Yes ☒	No ☐	☐ Neoprene Gloves	
	Bloodborne Pathogen	Yes ☐	No ☒	☐ Butyl Gloves	
Body/Torso	Chemical Exposure	Yes ☐	No ☒	☐ Tyvek Suits: ☐ White or ☐ Yellow	
	Extreme Heat/Cold	Yes ☐	No ☒	☐ UV Protection	☒ First Aid Kit
	Abrasion	Yes ☒	No ☐	☐ Coveralls	☐ Traffic Cones
	Impact	Yes ☐	No ☒	☐ Reflective Vest	☐ Signage
	Electrical Arc	Yes ☒	No ☐	☐ Insect Repellent	☐ 2- Way Radios
	Biological Hazards	Yes ☐	No ☒	☐ Tick Removal Kit	☒ Flashlight
Fall	Fall Hazard	Yes ☐	No ☒	☐ Harness	☐ Fall Protection Lanyard
Noise	Noise Hazard	Yes ☒	No ☐	☒ Ear Plugs	☐ Ear Muffs
Respiratory	Chemical Exposure	Yes ☐	No ☒	☐ Respirator: ☐ ½ Face or ☐ Full Face	
	Confined Spaces	Yes ☐	No ☒	☐ Cartridge: ☐ P or ☐ OV or ☐ C	
	Particulate Exposure	Yes ☐	No ☒		
	Welding Hazard	Yes ☐	No ☒		

SITE CONTROL		
Site Control/Site Security[1]: ***Describe Measures***	The work is within a controlled building, so access to the work areas is limited.	M & PT: ☐ Y ☒ N *If yes, sketch information on separate sheet*
Confined Space Entry: *If Yes, Attach Permit*	☐ Y ☒ N	
Decontamination: *If Yes, Describe Procedures*	☒ Y ☐ N Decontamination of equipment only, as necessary	
Site Monitoring[2]: *If Yes, Describe Procedures*	☐ Y ☒ N	

CONTINGENCY PLAN		
Emergency Contacts: *Provide Telephone Numbers*	Police: 911 Ambulance: 911 Fire: 911 Hospital: 518-262-1200	Client Contact: Michael Arcangel Client Phone #: 518-862-9133 CHA PM Phone #: 518-453-4547 Poison Control: 800 336-6997
Route to Hospital:	See Attached	
Communication:	☒ Cell Phone ☐ Nearest Pay Phone ☐ Pager	
Comments:		

PLAN SIGN-OFF			
Name:	Name:	Name:	Name:
X:	X:	X:	X:
Date:	Date:	Date:	Date:
Name:	Name:	Name:	Name:
X:	X:	X:	X:
Date:	Date:	Date:	Date:

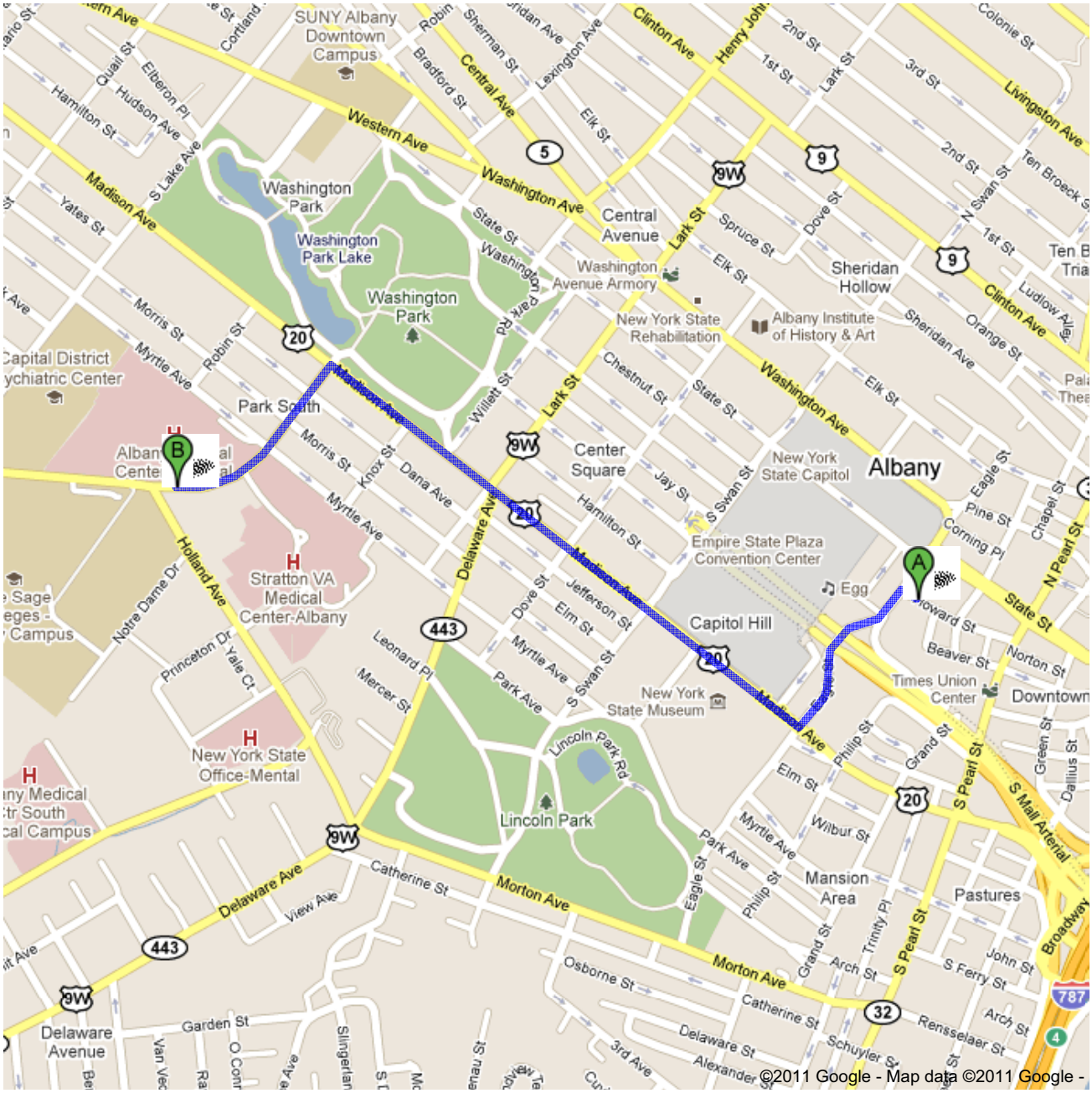
SAFETY TRAINING/MEDICAL MONITORING			
Type:	Type:	Type:	Type:
Date:	Date:	Date:	Date:
Type:	Type:	Type:	Type:
Date:	Date:	Date:	Date:

1 Who is providing site control/site security, if any, for this task? Examples of Site Control/Site Security include police, client representative(s), owner(s), CHA or client supervisors

2 What are you monitoring on site, if any, for this task? Examples of Site Monitoring include air monitoring, like carbon monoxide or oxygen levels or wet bulb temperatures

Google maps

Directions to Albany Medical Center Hospital
43 New Scotland Avenue, Albany, NY 12208 - (518) 262-3125
1.4 mi – about **5 mins**



67 Howard St, Albany, NY 12207

	1. Head **northwest** on **Howard St** toward **Eagle St**	go 135 ft total 135 ft
	2. Turn left at **Eagle St** About 1 min	go 0.3 mi total 0.3 mi
	3. Take the 2nd right onto **US-20 W/Madison Ave** Continue to follow US-20 W About 3 mins	go 0.8 mi total 1.1 mi
	4. Turn left at **New Scotland Ave** Destination will be on the right About 1 min	go 0.3 mi total 1.4 mi

Albany Medical Center Hospital
43 New Scotland Avenue, Albany, NY 12208 - (518) 262-3125

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

Directions weren't right? Please find your route on maps.google.com and click "Report a problem" at the bottom left.

APPENDIX B

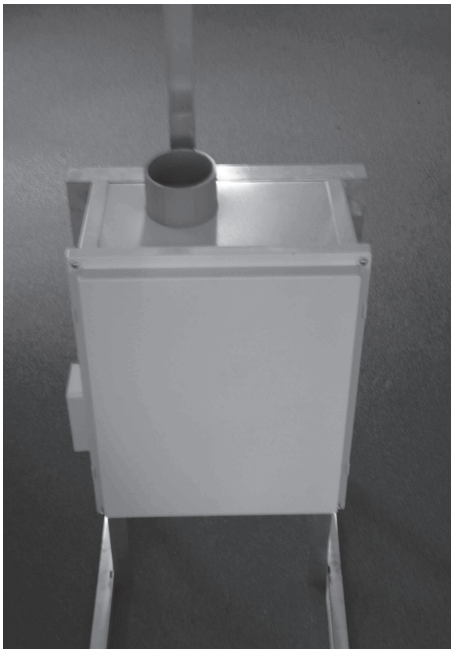
Manufacturer Data Sheets

THE OBAR GBR76

Attachment 1a

COMPACT RADIAL BLOWER

Based on 25 years of experience and 2 years of research and development, the patent pending GBR series of compact radial blowers provide the perfect combination of performance and design.



GBR76 WITH ROOF MOUNT

PERFORMANCE

- GBR76 HO 41" WC @ 0 Max flow 160 cfm.
- Built in speed control to customize performance.
- Condensate bypass built in.
- 18 month warranty 40,000 hr sealed bearings.

DESIGN

- Our modular design means the blower and manifold assembly can be removed and replaced as a unit. This makes repairs cost effective and easy and allows contractors to upgrade systems simply by swapping assemblies.
- The GBR series is based on a bypass blower designed to handle combustible materials.
- The housing is not required to be air tight so you can add gauges and alarms without compromising the system.
- Built in condensate bypass.
- Built in speed control.
- Quick disconnect electrical harness.
- All UL listed components including UL listed enclosure for outside use.
- Wall fastening lugs included.
- GBR series roof and wall mounts available to quickly configure the blowers for your installation while providing a custom built look.
- Compact design 16"x 14"x 8" weighing only 18 lbs.

OBAR SYSTEMS INC 117 POCANTECS ROAD HIGHLAND LAKES NJ 07422 800 949 6227

GBR76 HO	0”	10”	20”	30”	40”	Wattage
HO 40	155	110	72	40	10	400-575
HO 30	150	108	70	22	0	375-415
HO 20	141	99	20	0		200-350

Blower Specifications

Notes:

- **Input Voltage Range:** 108-132 Volts AC RMS, 50/60 Hz, single phase.
- **Input Current:** 6 amps AC RMS
- **Operating Temperature (Ambient Air and Working Air):** 0°C to 50°C
- **Storage Temperature:** -40°C to 85°C
- **Dielectric Testing:** 1500 Volts AC RMS 60 Hz applied for one second between input pins and ground, 3mA leakage maximum.
- **Speed Control Methods:** PWM (Pulse Width Modulation) (1 kHz to 10 kHz)
  0 to 10 VDC speed control.
  Mechanical: A potentiometer is available for speed control of the blower. The potentiometer can be preset for a specific speed. Access for speed adjustment located in motor housing.
- **Approximate Weight:** 4.8 Lbs. / 2.2 Kg
- **Regulatory Agency Certification:** Underwriters Laboratories Inc. UL507 Recognized under File E94403 and compliant under the CE Low Voltage Directive 2006/95/EC.
- **Design Features:** Designed to provide variable airflow for low NOx & CO emission in high efficiency gas fired combustion systems. Built with non-sparking materials. Blower housing assembly constructed of die cast aluminum. Impeller constructed from hardened aluminum. Rubber isolation mounts built into blower construction to dampen vibration within the motor. Two piece blower housing assembly sealed with O-ring gasket for combustion applications. Customer is responsible to check for any leakage once the blower is installed into the final application.
- **Miscellaneous:** Blower inlet, discharge, and all motor cooling inlet and discharge vents must not be obstructed. Motor ventilation air to be free of oils and other foreign particles, (i.e. breathing quality air). Blower is to be mounted so ventilation air cannot be re-circulated.
  POWER CONNECTION: Blower connector, AMP Universal MATE-N-LOK, part no. 1-350943-0.
  SPEED CONNECTION: Blower connector, Molex Mini-Fit Jr., part no. 39-30-3056.
  Mating harnesses available upon request.

Enclosure Specifications

Rating:

Ingress Protection (EN 60529): 66/67

Electrical insulation: Totally insulated

Halogen free (DIN/VDE 0472, Part 815): yes

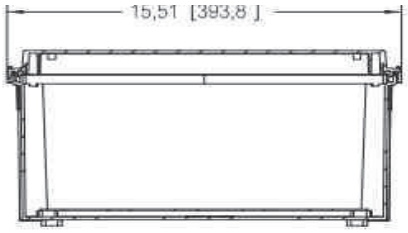
UV resistance: UL 508

Flammability Rating (UL 746 C 5): complies with UL 508

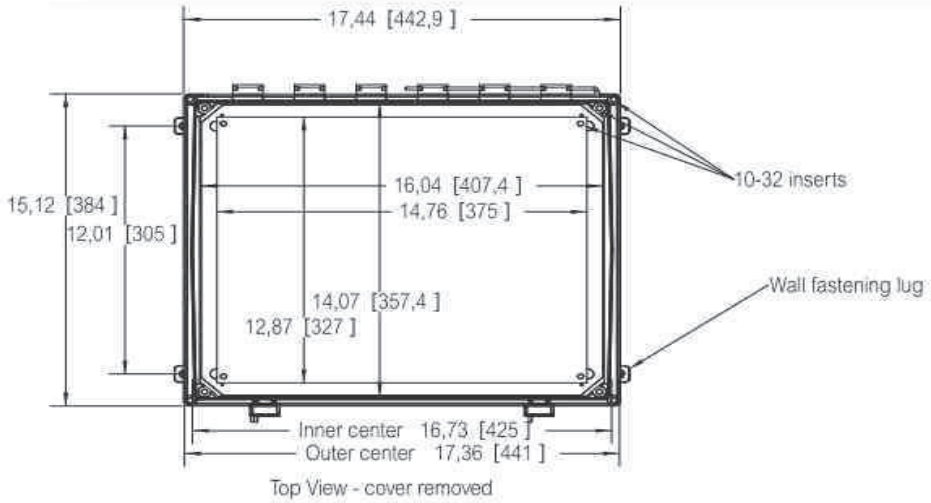
Glow Wire Test (IEC 695-2-1) °C: 960

NEMA Class: UL Type 4, 4X, 6, 6P, 12 and 13

Certificates: Underwriters Laboratories



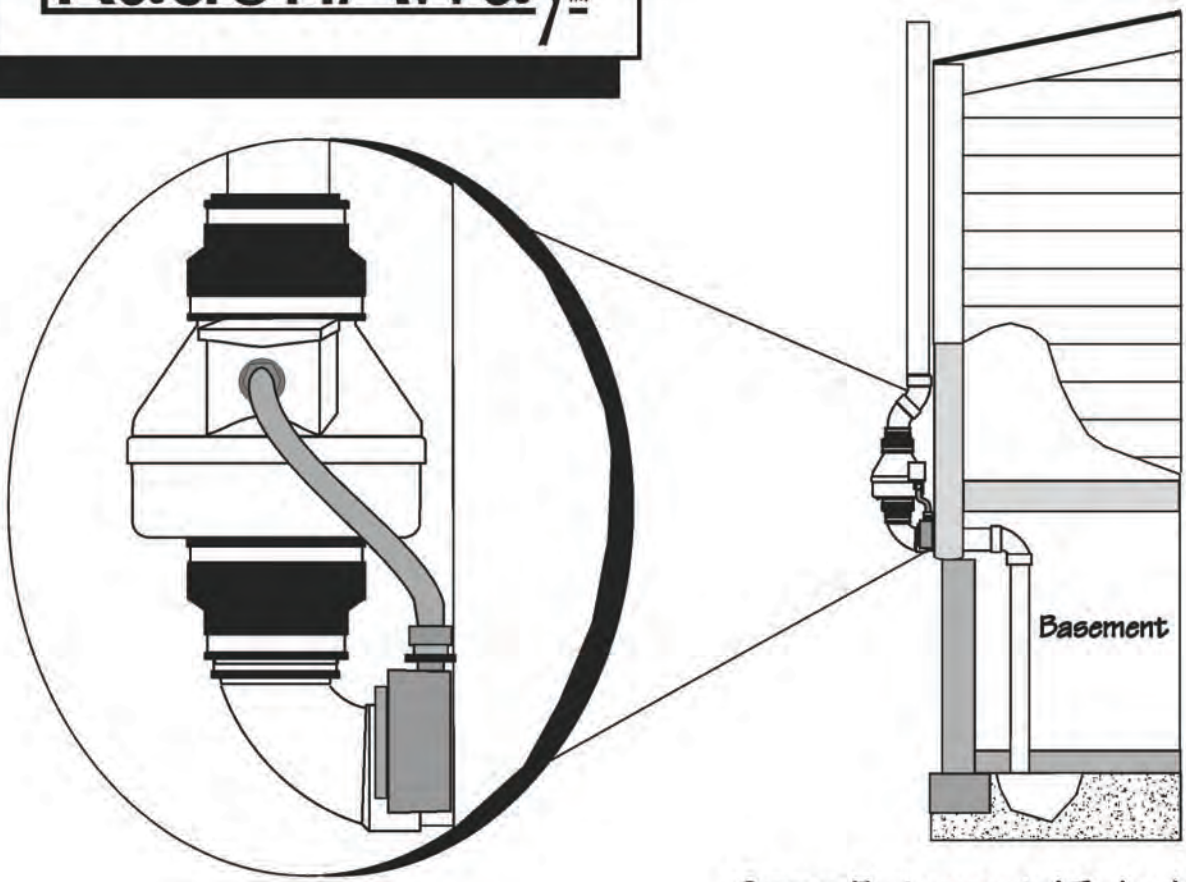
Screw cover



Top View - cover removed

RP Series Installation Instructions

By RadonAway™



Spruce Environmental Technologies, Inc.
Ward Hill, MA P/N IN020 Rev J

RadonAway™

Series Fan Installation 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.

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

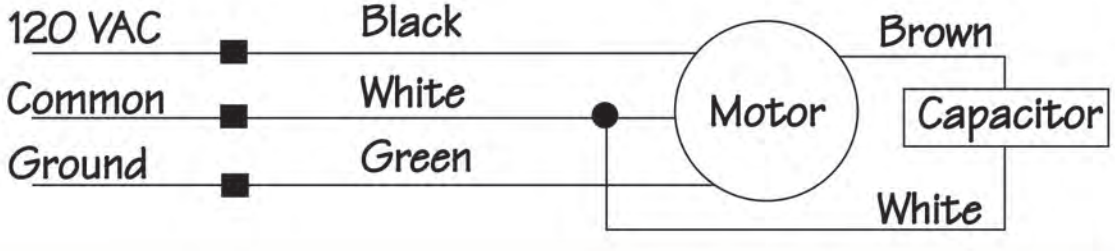
4. **WARNING!** Normal operation of this device may affect the combustion airflow needed for safe operation of fuel burning equipment. Check for possible backdraft conditions on all combustion devices after installation.

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!** 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.

DynaVac RP Series Fan Wiring Diagram



INSTALLATION INSTRUCTIONS IN020 Rev I

DynaVac - RP Series
RP140 p/n 23029-1
RP145 p/n 23030-1
RP260 p/n 23032-1
RP265 p/n 23033-1
RP380 p/n 28208

1.0 SYSTEM DESIGN CONSIDERATIONS

1.1 INTRODUCTION

The DynaVac RP Series Radon Fans are intended for use by trained, professional Radon mitigators. The purpose of this instruction is to provide additional guidance for the most effective use of a DynaVac Fan. This instruction should be considered as a supplement to EPA 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 RP Series 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.

1.3 ACOUSTICS

The RP Series Fan, when installed properly, operates 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.

1.4 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 Series Fan. The lack of cooling air may result in the 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 fan be turned off until the water recedes allowing for return to normal operation.

1.5 SLAB COVERAGE

The RP Series Fan 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 Series Fan best suited for the sub-slab material can improve the slab coverage. The RP140/145/155 are best suited for general purpose use. The RP260 can be used where additional airflow is required and the RP265/380 is 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.

1.6 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 Series 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 Series Fans are **NOT** suitable for underground burial.

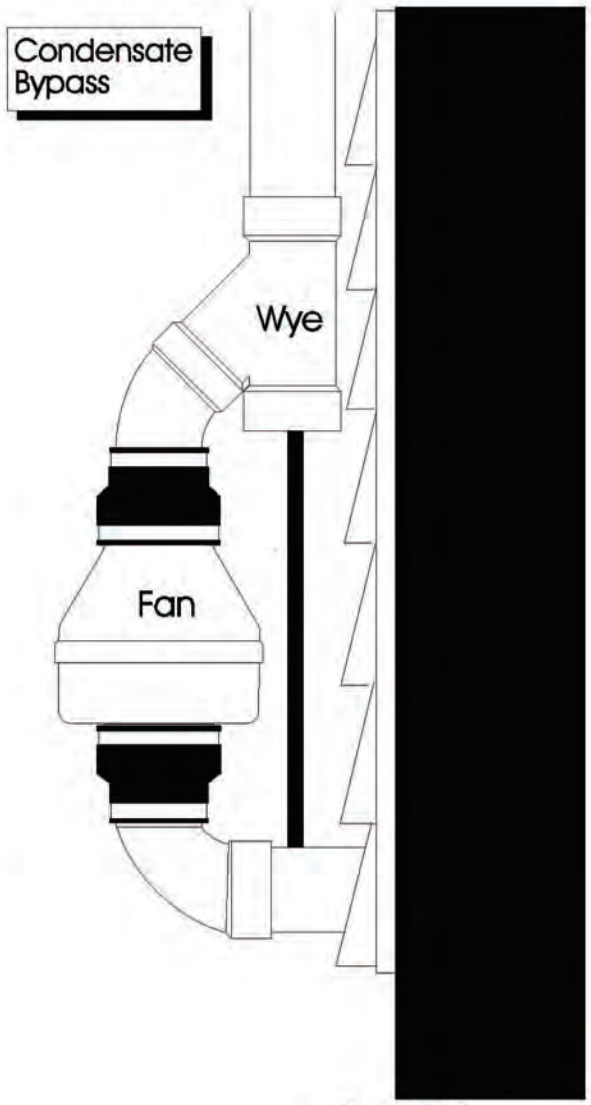
For RP Series Fan piping, the following table provides the minimum recommended pipe diameter and pitch under several system conditions.

Pipe Dia.	Minimum Rise per Ft of Run*				
	@25 CFM	@50 CFM	@100 CFM	@200 CFM	@300 CFM
6"	-	3/16	1/4	3/8	3/4
4"	1/8	1/4	3/8	2 3/8	-
3"	1/4	3/8	1 1/2	-	-

*Typical RP1xx/2xx Series Fan operational flow rate is 25 - 90 CFM 0n 3" and 4" pipe. (For more precision, determine flow rate by measuring Static Pressure, in WC, and correlate pressure to flow in the performance chart in the addendum.)

Under some circumstances in an outdoor installation a condensate bypass should be installed in the outlet ducting as shown. This may be particularly true in cold climate installations which require long lengths of outlet ducting or where the outlet ducting is likely to produce large amounts of condensation because of high soil moisture or outlet duct material. Schedule 20 piping and other thin-walled plastic ducting and Aluminum downspout will normally produce much more condensation than Schedule 40 piping.

The bypass is constructed with a 45 degree Wye fitting at the bottom of the outlet stack. The bottom of the Wye is capped and fitted with a tube that connects to the inlet piping or other drain. The condensation produced in the outlet stack is collected in the Wye fitting and drained through the bypass tube. The bypass tubing may be insulated to prevent freezing.



1.7 "SYSTEM ON" INDICATOR

A properly designed system should incorporate a "System On" Indicator for affirmation of system operation. A manometer, such as a U-Tube, or a vacuum alarm is recommended for this purpose.

1.8 ELECTRICAL WIRING

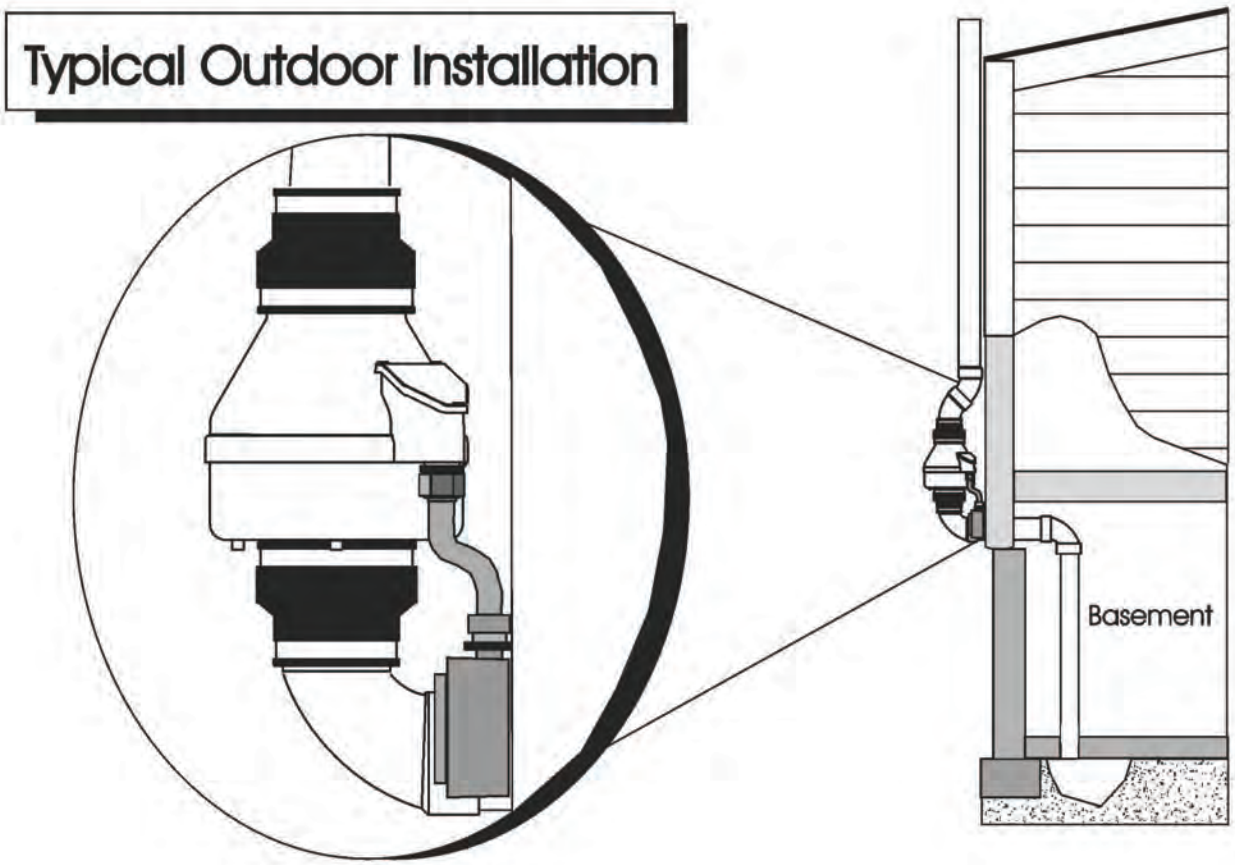
The RP Series Fans operate on standard 120V 60 Hz. AC. All wiring must be performed in accordance with the National Fire Protection Association's (NFPA)"National Electrical Code, Standard #70"-current edition for all commercial and industrial work, and state and local building codes. All wiring must 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 sealed to prevent water penetration into the box. A means, such as a weep hole, is recommended to drain the box.

1.9 SPEED CONTROLS

The RP Series Fans are rated for use with electronic speed controls ,however , they are generally not recommended.

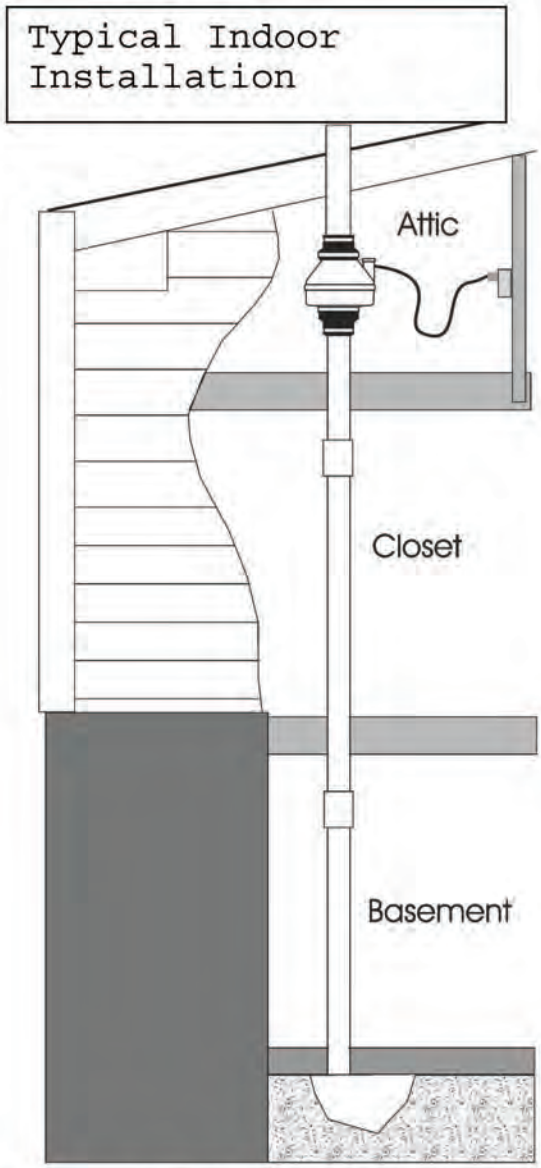
2.0 INSTALLATION

The RP Series Fan can be mounted indoors or outdoors. (It is suggested that EPA recommendations be followed in choosing the fan location.) The RP Series Fan may be mounted directly on the system piping or fastened to a supporting structure by means of optional mounting bracket.



2.1 MOUNTING

Mount the RP Series Fan vertically with outlet up. Insure 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.



2.2 MOUNTING BRACKET (optional)

The RP Series fan may be optionally secured with the RadonAway P/N 25007-2 (25033 for RP385) mounting bracket. 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 means of disconnect for servicing the unit and vibration isolation.

2.4 ELECTRICAL CONNECTION

Connect wiring with wire nuts provided, observing proper connections(See Section 1.8):

Fan Wire	Connection
Green	Ground
Black	AC Hot
White	AC Common

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

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

_____ **Insure** the RP Series Fan and all ducting is secure and vibration-free.

_____ **Verify** system vacuum pressure with manometer. **Insure** vacuum pressure is **less than** 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.**

RP SERIES PRODUCT SPECIFICATIONS

The following chart shows fan performance for the RP Series Fan:

Typical CFM Vs Static Pressure "WC									
	0"	.25"	.5"	.75"	1.0"	1.25"	1.5"	1.75"	2.0"
RP140	135	103	70	14	-	-	-	-	-
RP145	166	146	126	104	82	61	41	21	3
RP260	272	220	176	138	103	57	13	-	-
RP265	334	291	247	210	176	142	116	87	52
RP380*	497	401	353	281	220	176	130	80	38

* Tested with 6" inlet and discharge pipe.

Power Consumption 120 VAC, 60Hz 1.5 Amp Maximum		Maximum Recommended Operating Pressure* (Sea Level Operation)**	
RP140	17 - 21 watts	RP140	0.8" W.C.
RP145	41 - 72 watts	RP145	1.7" W.C.
RP260	52 - 72 watts	RP260	1.5" W.C.
RP265	91 - 129 watts	RP265	2.2" W.C.
RP380	95 - 152 watts	RP380	2.0" W.C.

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

	Size	Weight	Inlet/Outlet
RP140	8.5H" x 9.7" Dia.	5.5 lbs.	4.5" OD (4.0" PVC Sched 40 size compatible)
RP145	8.5H" x 9.7" Dia.	5.5 lbs.	4.5" OD (4.0" PVC Sched 40 size compatible)
RP155	8.5H" x 9.7" Dia.	5.5 lbs.	5.0" OD
RP260	8.6H" x 11.75" Dia.	5.5 lbs.	6.0" OD
RP265	8.6H" x 11.75" Dia.	6.5 lbs.	6.0" OD
RP380	10.53H" x 13.41" Dia.	11.5 lbs.	8.0" OD

Recommended ducting: 3" or 4" RP1xx/2xx, 6" RP380, Schedule 20/40 PVC Pipe

Mounting: Mount on the duct pipe or with optional mounting bracket.

Storage temperature range: 32 - 100 degrees F.

Normal operating temperature range: -20 - 120 degrees F.

Maximum inlet air temperature: 80 degrees F.

Continuous Duty

Class B Insulation

Thermally protected

3000 RPM

Rated for Indoor or Outdoor Use

LISTED Electric Fan ETL® 77728 Tested to UL Std. 507 ® 2100 HVI CERTIFIED

IMPORTANT INSTRUCTIONS TO INSTALLER

Inspect the GP/XP/XR/RP 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 GP/XP/XR/RP Series Fan in accordance with all EPA standard practices, and state and local building codes and state regulations.

WARRANTY

Subject to any applicable consumer protection legislation, RadonAway warrants that the GPX01/XP/XR/RP 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. 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.

5 YEAR EXTENDED WARRANTY WITH PROFESSIONAL INSTALLATION.

RadonAway will extend the Warranty Term of the fan to 5 years from date of manufacture if the Fan is installed in a professionally designed and professionally installed radon system or installed as a replacement fan in a professionally designed and professionally installed radon system. 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.

EXCEPT AS STATED ABOVE, THE GPx01/XP/XR/RP 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 cost to and from factory.

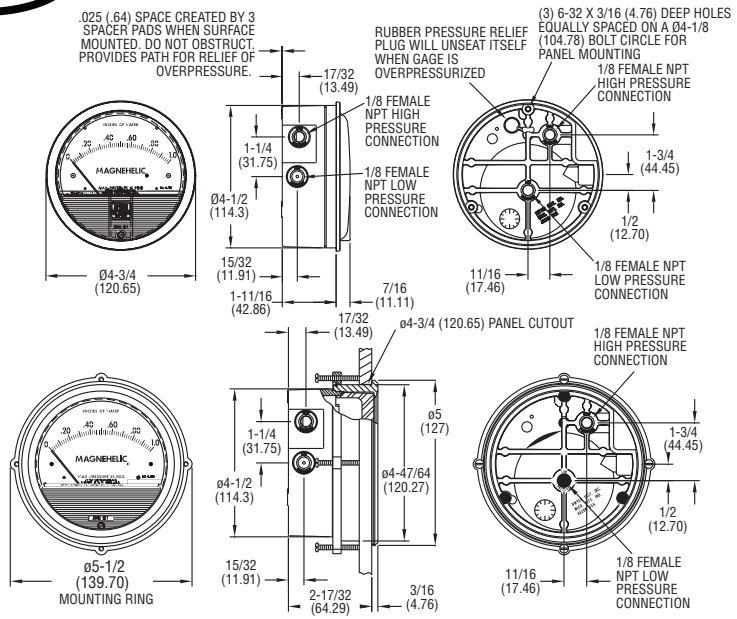
RadonAway
3 Saber Way
Ward Hill, MA 01835
TEL. (978) 521-3703
FAX (978) 521-3964

Record the following information for your records:

Serial No._____
Purchase Date_____

Bulletin A-27

Magnehelic® Differential Pressure Gage



**The blowout plug is not used on models above 180 inches of water pressure, medium or high pressure models, or on gages which require an elastomer other than silicone for the diaphragm.*

STANDARD GAGE ACCESSORIES: Two 1/8″ NPT plugs for duplicate pressure taps, two 1/8″ pipe thread to rubber tubing adapters and three flush mounting adapters with screws.

MP AND HP GAGE ACCESSORIES: Mounting ring and snap ring retainer substituted for 3 adaptors, 1/4" compression fittings replace 1/8" pipe thread to rubber tubing adaptors.

OVERPRESSURE PROTECTION: Standard Magnehelic® Differential Pressure Gages are rated for a maximum pressure of 15 psig and should not be used where that limit could be exceeded. Models employ a rubber plug on the rear which functions as a relief valve by unseating and venting the gage interior when over pressure reaches approximately 25 psig (excludes MP and HP models). To provide a free path for pressure relief, there are four spacer pads which maintain .023″ clearance when gage is surface mounted. Do not obstruct the gap created by these pads.

SPECIFICATIONS

Service: Air and non-combustible, compatible gases. (Natural Gas option available.)
Wetted Materials: Consult factory.
Housing: Die cast aluminum case and bezel, with acrylic cover. (MP model has polycarbonate cover).
Accuracy: ±2% of full scale (±3% on - 0, -100 Pa, -125 Pa, 10MM and ±4% on -00, - 00N, -60 Pa, -6MM ranges), throughout range at 70°F (21.1°C).
Pressure Limits: -20″ Hg to 15 psig.† (-0.677 bar to 1.034 bar); MP option: 35 psig (2.41 bar), HP option: 80 psig (5.52 bar).
Overpressure: Relief plug opens at approximately 25 psig (1.72 bar), standard gages only. The blowout plug is not used on models above 180 inches of water pressure, medium or high pressure models, or on gages which require an elastomer other than silicone for the diaphragm.
Temperature Limits: 20 to 140°F (-6.67 to 60°C). *Low temperature models available as special option.
Size: 4″ (101.6 mm) diameter dial face.
Mounting Orientation: Diaphragm in vertical position. Consult factory for other position orientations.
Process Connections: 1/8″ female NPT duplicate high and low pressure taps - one pair side and one pair back.
Weight: 1 lb 2 oz (510 g), MP & HP 2 lb 2 oz (963 g).
Agency Approvals: RoHS.

†For applications with high cycle rate within gage total pressure rating, next higher rating is recommended. See Medium and High pressure options.

Note: May be used with hydrogen when ordering Buna-N diaphragm. Pressure must be less than 35 psi.

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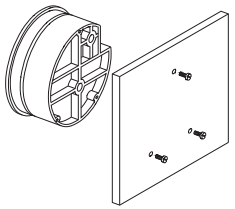
e-mail: info@dwyer-inst.com

INSTALLATION

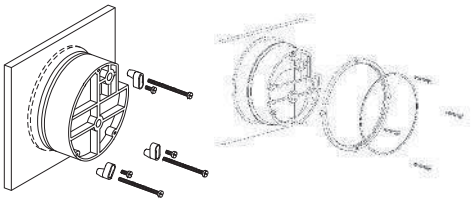
Select a location free from excessive vibration and where the ambient temperature will not exceed 140°F (60°C). Also, avoid direct sunlight which accelerates discoloration of the clear plastic cover. Sensing lines may be run any necessary distance. Long tubing lengths will not affect accuracy but will increase response time slightly. Do not restrict lines. If pulsating pressures or vibration cause excessive pointer oscillation, consult the factory for ways to provide additional damping.
All standard Magnehelic® Differential Pressure Gages are calibrated with the diaphragm vertical and should be used in that position for maximum accuracy. If gages are to be used in other than vertical position, this should be specified on the order. Many higher range gages will perform within tolerance in other positions with only rezeroing. Low range models of 0.5" w.c. plus 0.25" w.c. and metric equivalents must be used in the vertical position only.

SURFACE MOUNTING



Locate mounting holes, 120° apart on a 4-1/8" dia. circle. Use No. 6-32 machine screws of appropriate length.

FLUSH MOUNTING



Provide a 4-9/16" dia. (116 mm) opening in panel. Provide a 4-3/4" dia. (120 mm) opening for MP and HP models. Insert gage and secure in place with No. 6-32 machine screws of appropriate length, with adapters, firmly secured in place.

PIPE MOUNTING

To mount gage on 1-1/4" - 2" pipe, order optional A-610 pipe mounting kit.

TO ZERO GAGE AFTER INSTALLATION

Set the indicating pointer exactly on the zero mark, using the external zero adjust screw on the cover at the bottom. Note that the zero check or adjustment can only be made with the high and low pressure taps both open to atmosphere.

OPERATION

Positive Pressure: Connect tubing from source of pressure to either of the two high pressure ports. Plug the port not used. Vent one or both low pressure ports to atmosphere.
Negative Pressure: Connect tubing from source of vacuum or negative pressure to either of the two low pressure ports. Plug the port not used. Vent one or both high pressure ports to atmosphere.
Differential Pressure: Connect tubing from the greater of two pressure sources to either high pressure port and the lower to either low pressure port. Plug both unused ports.
When one side of the gage is vented in dirty, dusty atmosphere, we suggest an A-331 Filter Vent Plug be installed in the open port to keep inside of gage clean.

A. For portable use of temporary installation use 1/8" pipe thread to rubber tubing adapter and connect to source of pressure with flexible rubber or vinyl tubing.
B. For permanent installation, 1/4" O.D., or larger, copper or aluminum tubing is recommended.

MAINTENANCE

No lubrication or periodic servicing is required. Keep case exterior and cover clean. Occasionally disconnect pressure lines to vent both sides of gage to atmosphere and re-zero. Optional vent valves should be used in permanent installations. The Series 2000 is not field serviceable and should be returned if repair is needed (field repair should not be attempted and may void warranty). Be sure to include a brief description of the problem plus any relevant application notes. Contact customer service to receive a return goods authorization number before shipping.

WARNING

Attempted field repair may void your warranty. Recalibration or repair by the user is not recommended.

TROUBLE SHOOTING TIPS

Gage won't indicate or is sluggish.

1. Duplicate pressure port not plugged.
2. Diaphragm ruptured due to overpressure.
3. Fittings or sensing lines blocked, pinched, or leaking.
4. Cover loose or "O"ring damaged, missing.
5. Pressure sensor, (static tips, Pitot tube, etc.) improperly located.
6. Ambient temperature too low. For operation below 20°F (-7°C), order gage with low temperature, (LT) option.

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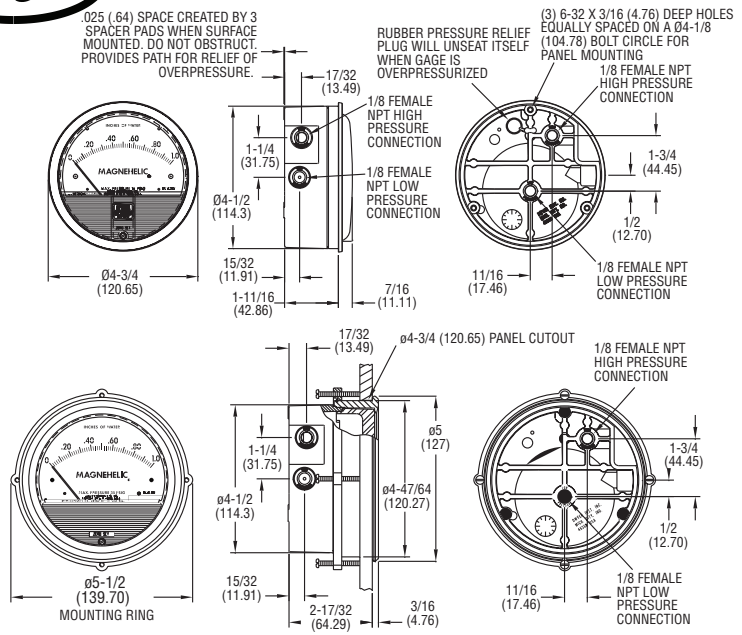
Magnehelic® Differential Pressure Gage
INSTRUCCIONES Y LISTA DE PARTES



(El tapón de goma no es usado en los modelos sobre 180 pulgadas de presión de agua, modelos de presión media o alta, o en instrumentos que requieren un elastizado en cualquier otro material que no sea silicona para el diafragma.)

Accesorios: Tapones 1/8" NPT para las conexiones duplicadas, dos adaptadores de rosca 1/8" NPT a tubo de goma; y tres adaptadores para montaje al ras y tornillos.

Accesorios para Los Modelos MP y HP: El anillo de montaje y el retensor del anillo de presión son substituidos por 3 adaptadores, accesorios de compresión de 1/4" remplazan a los adaptadores de rosca 1/8" a tubo de goma.

Protección Para Sobrepresión: Los Manómetros Diferenciales Magnehelic Estándar están clasificados para una presión máxima de 15 psi y no se deberían de usar donde el límite puede excederse. Los modelos emplean un tapón de goma en el trasero que funciona como una válvula de alivio desmontándose y ventilando el interior del instrumento cuando la sobrepresión alcanza aproximadamente 25 psig. (Los modelos MP y HP son excluidos) Para proveer un camino libre para el alivio de presión, el instrumento viene con rodilleras que mantienen un espacio de .023" cuando el instrumento es montado en superficie. No bloque el espacio creado por estas rodilleras.

† Para aplicaciones con alto ciclo de velocidad dentro de la clasificación de presión total del instrumento, la próxima clasificación mas alta es recomendada. Vea las opciones de media y alta presión.

El instrumento puede ser usado con hidrogeno cuando se ordena con diafragma de Buna-N. La presion tiene que ser menos de 35 psi.

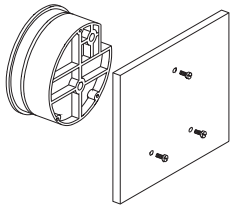
ESPECIFICACIONES

Servicio: aire y gases no combustibles, gases compatibles. (ópcion disponible para uso con gas natural).
Materiales Mojados: Consulte con la fábrica.
Carcasa: Caja y anillo de retención de aluminio fundido a presión con tapadera de acrílico. (El modelo MP tiene la tapadera de policarbonato.)
Exactitud: ±2% de fondo de escala a 21 °C
Mod. 2000-0 ±3%; Mod. 2000-00 ±4%
Límite de Presión: -20 Hg. a 15 psig. † (-0.677 bar a 1,034 bar); opción MP: 35 psig (2.41 bar), opción HP: 80 psig (5.52 bar).
Sobrepresión: El tapón de alivio se abre aproximadamente a los 25 psig, modelos estandard únicamente. El tapón de goma no es usado en los modelos sobre 180 pulgadas de presión de agua, modelos de presión media o alta, o en instrumentos que requieren un elastizado en cualquier otro material que no sea silicio para el diafragma.
Límite de Temperatura: -6.67 a 60ºC. * Modelos de baja temperatura disponibles como opción especial.
Dimensiones: diám. 120,65 mm x 55,6 prof.
Orientación de Montaje: El diafragma debe ser usado solo en posición vertical. Consulte con la fábrica para otras orientaciones de posición.
Conexiones: 1/8" NPT para alta y baja presión, duplicadas (atrás, a los lados).
Peso: 510 g, MP y HP 963 g.
Aprobación de la agencia: RoHS.

Instalacion

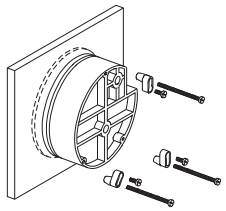
Seleccione un lugar libe de exceso de vibraciones, y donde la temperatura ambiente no supere los 60°C. Evite luz solar directa, para evitar decoloración de la cubierta plástica. Las conexiones de proceso pueden tener cualquier longitud sin afectar la exactitud, pero pueden extender el tiempo de respuesta del instrumento. Si hay pulsación de presión o vibración, consulte a fábrica sobre medios de amortiguación.
Los MAGNEHELIC han sido calibrados con el diafragma vertical, y deben ser usados en esas condiciones. Para otras posiciones, se debe especificar en la orden de provisión. Los de rango elevado pueden ser usados en diversas posiciones, pero se debe reajustar el cero. Los modelos de la serie 2000-00 y equivalentes métricos deben ser usados solo verticalmente.

Montaje en Superficie



Perfore tres orificios separados 120° sobre una circunferencia de 105 mm de diám. y sostenga el instrumento con tres tornillos 6-32 de long. apropiada.

Montaje alineado



Perfore un circulo de 115 mm de diám. en el panel, y sostenga el instrumento mediante los.

Montaje Sobre Pipa

Para montar el instrumento sobre pipas de 32 a 50 mm de diám., ordene el adaptador opcional A-610.

Puesta a Cero Después de Instalar

Deje las conexiones de presión abiertas a atmósfera y ajuste a cero desde tornillo del panel frontal.

Operacion

Presión Positiva: Conecte la tubería desde la fuente de presión a cualquiera de las dos conexiones de alta presión (HIGH), bloqueando la no usada; Las conexiones de baja (LOW) presión pueden dejarse uno o los dos abiertos a la atmósfera.
Presión Negativa: Repita el procedimiento anterior, conectado en este caso las conexiones de baja presión (LOW). Deje las otras conexiones abiertas.
Presión diferencial: Conecte el tubo correspondiente a la presión más positiva al cualquiera de los conectores de alta presión (HIGH) bloqueando el no usado, y la más baja presión o presión negativa (vacío) al conector de baja presión (LOW). Puede usarse cualquier conector de cada par, dejando siempre uno bloqueado. Si se deja una conexión abierta a la atmósfera, se recomienda el uso de un filtro tipo A-331 en el lugar correspondiente para mantener limpio el interior del instrumento. Para uso portable, o instalación temporaria, uso adapta dores para rosca de tubo de 1/89 a tubo flexible, y conecte a proceso mediante una tubería de goma, o equivalente. Para instalación permanente, se recomienda el uso de tubo de cobre o aluminio de por lo menos 1/4" de diám. exterior.

No se requiere mantenimiento específico alguno, ni lubricación. Periódicamente, desconecte el instrumento, ventee la presión acumulada, y reajuste el cero. Para instalaciones permanentes, se debe usar un juego de válvulas de montaje permanente para el venteo.
El instrumento de Serie 2000 no puede ser re parado en el campo y debería de ser regresado si reparos son necesarios (Reparos en el campo no deben de ser intentados y pueden cancelar la garantía.). Asegurarse de incluir una descripción breve del problema más cualquier notas pertinentes a la aplicación para devolución de productos antes de enviar el instrumento.

Cuidado! : La recalibración en campo puede invalidar la garantía. No se recomienda la recalibracion por parte del usuario. En caso necesario envie el instrumento con transporte pago a:

Localización De Fallas

• *El instrumento no indica, o es lento en reacción.*
1. Conexión duplicada abierta.
2. Diafragma roto por sobrepresión.
3. Tubería de conexión perforada, con pérdidas o pinchazos.
4. Anillo de retención flojo, u "O " ring dañado.
5. Conexión a proceso indebida o inadecuada.
6. Temperatura muy baja. Para este caso ordene tipos LT (baja temperatura).

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