STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Northwest Regional Office • 3190 160th Avenue SE • Bellevue, Washington 98008-5452 • (425) 649-7000

December 4, 2007

CERTIFIED MAIL
7007 0220 0004 7250 2587

Mr. Jim Sumner, Manager
Group Environmental Programs
General Electric Aircraft Engine
One Neumann Way, MD T165
Cincinnati, OH 45215

Dear Mr. Sumner:

Re: Approval with Ecology Modifications of Engineering Design Report-Vapor Intrusion Mitigation System, dated October 19, 2007

Thank you for submitting the Engineering Design Report-Vapor Intrusion Mitigation System, dated October 19, 2007 in accordance with the Agreed Order DE 4258, Section VII.G. The Washington State Department of Ecology (Ecology) received this document on October 22, 2007.

The Engineering Design Report (EDR) presents a good description of the Ecology required-vapor intrusion mitigation (VIM) installed at the 220 S. Dawson Street building. However, there are statements within the report where Ecology disagrees. Therefore, Ecology approves the engineering design report with the following revisions incorporated within:

Page 1-1, Section 1.0 Paragraph 2, first sentence: Ecology determined that trichloroethylene (TCE) vapor intrusion is occurring at the 220 S. Dawson building at unacceptable concentrations. Based on the sub-slab vapor and indoor air samples previously collected, Ecology required GE to install the VIM system as an interim action under an Agreed Order.

Page 3-1, Section 3.0, Paragraph 1: The purpose of the Ecology-required VIM system is to prevent unacceptable TCE vapor exposures to the occupants in the 220 S. Dawson Street building. This is based on the previous sub-slab vapor and indoor air samples. These are not "potential worker exposures" as stated in the report, but instead, actual exposures that have occurred and would continue to occur without the VIM system.

Page 3-1, Section 3.2.2: GE stated that an electrical permit was obtained for the VIM system installation. This permit was not included in the report as required by the Agreed Order and Ecology approved work plan.

Operation and Maintenance Plan:
Page 6-1, Section 6.1.1: GE shall include the following in the monthly inspections:

1. Check for (inside) pipe leaks (visible or audible).
2. Document, in writing, increasing and decreasing trends in vacuum at each sump manometer.
3. Brief discussion with all tenants (include their contact information) that operate parts of the building where the VIM system is installed. Ask, at a minimum, the following:
   a. Any problems with conducting business with the VIM system running.
   b. VIM system problems noticed.
   c. Damage to any part of the VIM.

Page 6-1, Section 6.1.2: GE shall inspect the VIM system every 12 months; before the building is re-occupied following any vacancy; **and** immediately after any significant modifications (including any dismantling and reconstruction of parts of the VIM system). Concrete joint seals shall be inspected annually for cracks.

GE shall provide Ecology with the results of the monthly inspections in the progress status reports. The results (including copies of the inspection forms) of the annual inspections shall be submitted to Ecology within 45-days of completion. The monthly inspections and annual inspection reports shall include recommendations for VIM system repair or modification, as necessary, based on VIM system observation.

The facility manager may conduct VIM operational checks. This is why the manometers were installed at each sump riser. However, operational checks by the facility manager are in addition to the required GE monthly and annual inspections. Perhaps GE meant to do this and Ecology did not fully understand the meaning of the statements.

Appendix A: Information Package

Page 4 of 4, Paragraph 1: If exposure to workers on the roof, near and downwind of the VIM exhaust vent, is for only a short period of time (a few days only) then the need for respiratory protection should be based on allowable TCE exposures under the Washington State Department of Labor and Industries, Division of Occupational Safety and Health. Roof workers exposed for longer periods of time near and downwind of the VIM exhaust vent should wear respirators if TCE levels are above MTCA Method C air cleanup levels.

Appendix D: Vapor System Inspection Form:

The vapor system inspection form shall include the following additional elements:

1. Fan and associated piping shall be inspected from the roof, including mounting frame
2. Check for (inside and outside) pipe leaks (visible or audible).
3. Document, in writing, increasing and decreasing trends in vacuum at each sump manometer.
4. Photographs of (a) each sub-slab sump and manometer, and (b) roof mounted fan.
5. Brief discussion with all tenants (include their contact information) that operate parts of the building where the VIM system is installed. Ask, at a minimum, the following:
   a. Any problems with conducting business with the VIM system running.
   b. VIM system problems noticed.
   c. Damage to any part of the VIM.

Please submit a copy of the electrical permit obtained for the installation of the VIM system, within 30-calendar days of your receipt of this certified letter as this is a requirement of the Ecology approved work plan and Agreed Order. Ecology is not requiring that GE re-submit this EDR. Instead, Ecology is modifying the EDR with all of the above corrections included, and approving this modified EDR.

If GE would like to discuss equally effective alternatives to the above described Ecology modifications, we can schedule a telephone conference call to discuss them.

Please contact me at (425) 649-7264 if you have any questions regarding this letter.

Sincerely,

Dean Yasuda

Dean Yasuda, P.E.
Environmental Engineer
Hazardous Waste and Toxics Reduction Program

DY:SA

cc: Marcia Bailey, EPA-X
Tom Merriman, Masons Supply Company
Stephen Black, Black & Yund
Greg Murphy, NOVA Consulting
Alex Cordas, Keymac-LCC
Jim Schwartz, AAG-Ecology
Brien Flanagan, Schwabe, Williamson & Wyatt
Julie Sellick, Ecology
Ed Jones, Ecology
Jamie Stevens, RETEC
Bill Joyce, Salter, Joyce, Ziker- PLLC
Bill Teplicky, McKinstry Co.
James King, Hudson Bay Insulation
Bob Webber, Puget Sound Pipe and Supply
Jill Lantz, RETEC
Steve Webber, Puget Sound Pipe and Supply
Tong Li, GWS
Randy Maciel, Hudson Bay Insulation
Central Records: WAD009278706 HZW 6.2

General Electric
WAD009278706
HSW 6.7.2

Central Files Copy

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James W. Sumner, Manager
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October 19, 2007

Mr. Dean Yasuda
Washington Department of Ecology
Northwest Regional Office
3190 – 160th Avenue S.E.
Bellevue, Washington 98008-5452

Dear Mr. Yasuda:

As required by Agreed Order # DE 4258, Section VII. G. attached please find the Engineering Design Report prepared by ENSR. Per our telephone discussion on October 11th, the air monitoring data will not be included in this report as it is scheduled for November 5, 2007. The air monitoring report will be submitted within 45 days of completion of the sampling.

Should you have any questions please do not hesitate to call me at (513) 672-3986 or Jamie Stevens at (206) 624-9349.

Sincerely,

James W. Sumner

Attachment – VIMS Engineering Report

cc: Julie Selick, DOE
Bill Teplicky, McKinstry
Bill Joyce – Salter Joyce Ziker
Tong Li, Ground Water Solutions
Susanne Herald, Esq. – GE
Jim Swartz, Esq State of Washington Attorney General's Office
Jamie Stevens, Linda Baker – RETEC

General Electric
WAD 009278706
AZW 6.7.2

Original Hand Signed letter sent separate from report

GE
Aviation

James W. Sumner, Manager
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Attachment – VIMS Engineering Report

cc: Julie Selick, DOE
Bill Teplicky, McKinstry
Bill Joyce – Salter Joyce Ziker
Tong Li, Ground Water Solutions
Susanne Herald, Esq. – GE
Jim Swartz, Esq State of Washington Attorney General's Office
Jamie Stevens, Linda Baker – RETEC

From: Origin ID: BFIA (206)624-9349
Jamie Stevens
ENSR
1011 Southwest Klickitat Way #207

Seattle, WA 98134

CLS090607/21/23

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System#: 1859212/INET7091
Account#: S *********

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Invoice #
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Dept #

SHIP TO: (206)624-9349 **BILL SENDER**

Dean Yasuda
WA.Department of Ecology
3190 160th Avenue Southeast

Bellevue, WA 98008

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General Electric
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Prepared for:
General Electric Aviation
Cincinnati, Ohio

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Final Engineering Report – Vapor Intrusion Mitigation System

The RETEC Group, Inc.
October 2007
Document No.: 02978-415-753

ENSR | AECOM

Prepared for:
General Electric Aviation
Cincinnati, Ohio

Final Engineering Report – Vapor Intrusion Mitigation System

Jamie C. Stevens

Prepared by Jamie C. Stevens, Project Manager

Reviewed by Mark Havighorst, P.E. Project Engineer

Jamie C. Stevens For:

Reviewed by Mark Hofferbert, P.E. Senior Project Engineer

The RETEC Group, Inc.
October 2007
Document No.: 02978-415-753

Merged with ENSR in 2007

Contents

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Engineer's Certification

I certify that the Washington State Department of Ecology- (Ecology) approved *IRM Work Plan – Sub-Surface Vapor Intrusion Interim Measure Work Plan and Design*, dated January 29, 2007, Revision 1, including all subsequent errata and Ecology-approved changes, was implemented, and all construction activities were completed in accordance with the Work Plan, and were witnessed by me or by a person under my direct supervision.

Work for this project was performed in accordance with generally accepted professional practices for the nature and condition of work completed in the same or similar localities, at the time the work was performed.

No other warranty, express or implied, is made.

EXPIRES 4/14/09

Mark Havighorst, P.E. Project Engineer
Washington State PE Number: 42644
Expiration Date: April 14, 2009

1.0 Introduction

GE Aviation (GE) is currently addressing environmental impacts to groundwater, soil, and indoor air at its former facility, 220 South Dawson Street in Seattle, Washington. As of the submittal date of this report, the building is occupied by Hudson Bay Insulation, Puget Sound Pipe & Supply, and Masons Supply Company[1].

Based on the results of the 2006 and 2007 indoor air and soil vapor sampling events, the Washington State Department of Ecology (Ecology) determined that trichloroethylene (TCE), presumably originating from soil vapor from below the building's floor, was present in indoor air at unacceptable concentrations. Based on the concentrations, mitigation of the building was required. Ecology had also stated that addressing the indoor air issue would be a required element of any remedial plan for the site, and requested that the work be performed as an Interim Remedial Measure (IRM). GE complied with the regulatory requests and proceeded to address Ecology's concerns through an IRM.

The IRM included implementation of an active sub-slab vapor ventilation system, (referred to as a Vapor Intrusion and Mitigation System [VIMS]) and identification and elimination of preferential soil vapor intrusion pathways. This Engineering Report summarizes the scope of work completed as part of the IRM and describes the design, implementation, and operation of the VIMS.

1.1 Supporting IRM Documents

The design, implementation, and operation of the VIMS was based on information provided in the following:

- Department of Ecology Agreed Order Number 4258 (Ecology, 2007a)
- *Sub-Surface Vapor Intrusion Interim Measures Work Plan and Design* (IRM Work Plan), dated January 29, 2007, Revision 1 (RETEC, 2007a)
- Department of Ecology letter dated February 23, 2007 re: Conditional Approval of the GE Sub-Surface Vapor Intrusion Interim Measures Work Plan and Design, Revision 1. Dated January 29, 2007 (Ecology, 2007b)
- *Revised Technical Memorandum No. 1* and *Sampling and Analysis Plan*, dated May 14, 2007 (RETEC, 2007b)
- *Technical Memorandum No. 2*, dated May 18, 2007 (RETEC, 2007c)
- Department of Ecology letter dated May 29, 2007 re: Ecology Response and Comments to Agreed Order Technical Memorandum No. 1 and Sampling and Analysis Plan, dated May 14, 2007 (Ecology, 2007c)
- Department of Ecology letter dated May 29, 2007 re: Ecology Response and Comments to Agreed Order DE-4528 Technical Memorandum No. 2, dated May 18, 2007 (Ecology, 2007d)
- GE Aviation letter dated May 31, 2007 re: Deadline Extension Pursuant to Section VII.J of Agreed Order # DE 4258 (GE, 2007a)
- Department of Ecology letter dated June 5, 2007 re: Time Extension Approval (Ecology, 2007e)
- GE Aviation letter dated July 6, 2007 re: Deadline Extension Pursuant to Section VII.J of Agreed Order # DE 4258 (GE, 2007b)
- Department of Ecology letter dated July, 2007 re: Time Extension Approval (Ecology, 2007f)

[1] The property is currently owned by Keymac, LLC, the building is managed jointly by Keymac and McKinstry Company.

- *Technical Memorandum No. 3*, dated July 24, 2007 (RETEC, 2007d)
- Department of Ecology letter dated August 15, 2007 re: Washington State Department of Ecology Response and Approval of the Vapor Intrusion Mitigation System Installation (Ecology, 2007g)
- *Sampling and Analysis Plan – Vapor Intrusion Mitigation Interim Action*, dated September 4, 2007, Revision 1 (RETEC, 2007e)
- Department of Ecology letter dated September 25, 2007 re: Contingent Approval of Revised Draft Sampling and Analysis Plan, dated September 4, 2007 (Ecology, 2007h).

The IRM was also designed and constructed in general conformance with the U.S. EPA's Radon Mitigation Standards, Document #402-R-93-078 [USEPA, 1994].

1.2 Scope of Work

The scope of work for the IRM included the following actions:

- Perform a building investigation (December 2005 through March 2007)
- Prepare a Work Plan and conceptual design (completed January 29, 2007)
- Receive written regulatory approval of the Work Plan (received February 27, 2007)
- Submit additional documentation requested by Ecology (May 18, May 14, and July 24, 2007)
- Mobilize to the site and conducted pre design testing and install sumps (June 1 through June 7, 2007)
- Construct the piping and electrical components, and conduct performance testing (completed week of August 1, 2007)
- Prepare this Final Engineering Report and O&M Plan.

Additional work remaining includes the collection of the post-IRM air sampling, which is scheduled for November 5, 2007. Sample results will be submitted to Ecology within 45 days of the sampling event.

2.0 Project Management and Organization

The ENSR Corporation (dba The RETEC Group, Inc. [RETEC]) was retained by GE as the Engineer for the project. RETEC prepared the construction documents and design, oversaw the remediation activities, and served as a liaison between GE, subcontractors, and building tenants. Advanced Radon Technologies (ART) was the subcontractor selected for the installation of the VIMS.

ART was selected by RETEC from among qualified soil vapor mitigation companies. ART had current certification from The National Environmental Health Association's (NEHA) National Radon Proficiency Program. ART has installed similar IRM systems for the Phillip Services Corporation's Georgetown Facility, located to the south of the site. ART was responsible for the performance of the work in accordance with the drawings and specifications incorporated in the IRM Work Plan. ART was provided with a copy of the Agreed Order and IRM Work Plan and was required to comply with it as a condition of their contract.

Ecology reviewed and approved the VIMS plans, and specifications presented in the IRM Work Plan and subsequent submittals.

3.0 Description of Interim Remedial Action

The purpose of VIMS is to prevent migration of vapors from below the building to inside the building, thereby reducing potential worker exposure. This is achieved by actively extracting air from five sumps constructed below the slab through a piping network connected to an inline centrifugal fan. Extracting the air not only removes potentially harmful volatile organic compound (VOC) vapors, but also decreases the pressure under the slab so that it is lower than inside the building. This negative pressure gradient reduces air flow upward through the slab. The air extracted by the fan discharges to the atmosphere.

The VIMS installed at the former GE building consists of five separate pits, each connected to a 3-inch and 4-inch PVC pipe riser that extends up from the concrete slab to the roof. Two risers are located in the northwest portion of the building and three are located in the southwest portion of the building (Figure 1). These locations were determined by Ecology and corresponded to sampling locations where elevated concentrations of TCE were detected in the sub-slab and indoor air. Each riser is connected to piping routed to a single, roof-mounted centrifugal fan that extracts the air from under the building foundation. The extracted air is vented through a stack located on the southwest portion of the roof. As all potential concentrations are below permissible limits set by Puget Sound Clean Air Agency (PSCAA) no permitting or end of stack treatment is required.

The following sub sections describe the two-phase implementation of the VIMS. Phase 1 included site preparation and diagnostic testing completed from June 1 through June 7, 2007. Phase 2 included VIMS construction and verification testing, which was completed from July 30 through August 6, 2007.

Figures 1 through 4 provide details of the final VIMS. Appendix A contains a copy of the information package and Appendix B includes copies of the construction photographs documenting Phase 1 and Phase 2.

3.1 Site Preparation and Diagnostic Testing

RETEC and ART coordinated their activities with the on-site Keymac/McKinstry representative and worked with individual building tenants, including Puget Sound Pipe & Supply, Hudson Bay Insulation, and Masons Supply Company. Sumps and associated piping was installed only in the Hudson Bay Insulation warehouse and the Puget Sound Pipe & Supply warehouse. IRM work areas were secured by ART to ensure the safety of workers, visitors, and other personnel.

Site preparation and diagnostic testing did not significantly disrupt or hinder site operations, but did take longer to complete than initially scheduled. RETEC and ART worked with individual tenants to coordinate start and stop times during each phase of work to minimize disruptions.

3.2 Permitting

3.2.1 Mechanical Permit

City of Seattle Mechanical Permit (CAM 415) # 6149569 was obtained as part of the VIMS construction. Copies of the Mechanical Permit documentation are included in Appendix C.

3.2.2 Electrical Permit

McKinstry Company performed all electrical work. Electrical permits were obtained directly by McKinstry and all work was performed by a Washington Licensed Electrician.

3.2.3 Air Permit

PSCAA issues permits for and regulates the emissions of toxic compounds into the atmosphere. Under Regulation 1, Article 6, Section 6.03.c under the heading Water Treatment, the following exemption for permit application is cited:

- (94) Soil and groundwater remediation projects involving <15 pounds per year of benzene or vinyl chloride, <500 pounds per year of perchloroethylene (PCE), and <1,000 pounds per year of toxic air contaminants[2].

Based on data presented in the revised Technical Memorandum No 2, the total mass of CVOCs potentially released is conservatively estimated at 48 pounds per year, well below the 1,000 pounds per year regulation limit at the current design flow rate (RETEC, 2007). Since projected emissions are well below the 1000 pound per year threshold, no air permit is required from PSCAA. Additionally, site vapor data resulted in no detections of vinyl chloride. Benzene is not a consistent of concern for vapor at the site. PCE was detected at very low concentrations and was included in the total emissions (the total emissions were found to be 48 pounds per year, below the PCE 500 pound per year threshold).

3.3 Utility Clearance, Combustion Devices Survey, and Back Drafting

Prior to any floor penetration activities, a utility locate was performed by Applied Professional Services (APS) on June 4, 2007. No utilities or structures were damaged during the work. The locations of overhead and subsurface structures were identified in each work areas, and the VIMS was constructed around any existing overhead structures.

A preliminary survey was done to ensure that no combustion devices were located inside the Puget Sound Pipe & Supply warehouse, Hudson Bay Insulation warehouse, or Masons Supply. The survey identified specific building characteristics, configurations, and operational conditions that would affect the design, installation, and effectiveness of the VIMS. No significant point sources of TCE-impacted vapor entry were identified in the building based on conversation with representatives from each business and an inspection by RETEC field staff of the warehouse spaces.

ART evaluated back drafting conditions by conducted a building pressure test. Prior to testing, all doorways, windows, building garages, and other accessible openings were sealed. The testing occurred at the end of a business day. The pressure difference between the inside atmosphere and the outside atmosphere was measured using a micro-manometer. The testing identified that back drafting is not a concern at the site.

3.4 Floor and Crack Sealing

Prior to diagnostic testing, all accessible floor cracks within the remedial area were cleaned out and sealed with flowable polyurethane caulk. The selected sealant did not contain TCE or vinyl chloride. All cracks were allowed 2 full days of minimal site activities to dry completely before continuation of the diagnostic testing. The sealant was allowed to dry over the weekend to minimize traffic and work activities over the sealed areas.

3.5 Initial Design Testing

Initial design testing for the VIMS was conducted from June 1 through June 7, 2007 to approximate the zone of influence at each sump location, the total number of sub-slab penetrations, the exhaust pipe diameters required, and the capacity of the exhaust fan. These test procedures are described below and are summarized in Tables 1 and 2.

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[2] PSCAA, 2006. Regulation 1. Puget Sound Clean Air Agency, October 26, 2006 (date of last revision to Section 6.03).

A diagnostic test fan, patented by ART and used on similar sites, was placed over the sump location. This test fan was used to simulate the negative pressure of a commercial fan when installed. Two ½-inch test holes were formed to evaluate the zone of influence around each sump location. The holes were placed around the perimeter of the concrete slab and formed to a depth equal to the sump excavation. The soil gas pressure was measured in each of the ½-inch holes. The test fan was then started and the static pressure and the air exhaust volume were gradually increased until negative air pressure (vacuum) was observed in each test hole. A DM1 Micro-Manometer by Infiltec was used to measure the pressure at each test hole.

The results of the diagnostic testing indicated that a subsurface vacuum of at least 1 Pascal (0.005 inches of water column) could be maintained throughout the targeted areas by installing 5 sumps and a single commercial VIMS fan.

Indoor air was periodically field-screened using a photoionization detector (PID) during initial design testing. Results of the PID monitoring are summarized in Table 1. The maximum value recorded was 0.6 ppm at location VIMS-5B, well below the OSHA permissible exposure limit.

3.6 VIMS Construction and Installation

3.6.1 VIMS Sumps

Five VIMS sumps were installed at the locations depicted on Figure 1. The sump locations are identified as:

- VIMS-1 and VIMS-5A – located in Puget Sound Pipe & Supply warehouse
- VIMS-3, VIMS-4, and VIMS-5B – located in Hudson Bay Insulation warehouse.

At each sump location selected an approximate 5-inch hole was drilled into the concrete slab with a diamond tip, non-impact core bore drill. To provide optimum pressure field extension below the slab, 3 cubic feet[3] (average) of soil was removed from the sub-surface immediately below each of the locations. The final sump shape consisted of flask type shape with an average depth of 3 feet.

3.6.2 VIMS Piping

Piping was installed to convey extracted air from the sumps to the exhaust fan and exhaust the air through the roof as shown on Figures 1 through 4. All 4-inch diameter piping is 3034 PVC sewer pipe, with the following exception of one section of the fan piping located outside on the roof. This one section of pipe is Schedule-40 PVC Water pipe (see Figure 1), which was selected over the 3034 PVC Sewer pipe because the pipe will be exposed to weather and vibrations. All 3-inch diameter piping is Schedule-40 PVC Water pipe.

The cleaning solvents and adhesives used to join PVC piping were recommended by the pipe manufacturers and were used in accordance with their directions.

VIMS piping was hung to the building structure using commercially available hangers and supports. Existing fixtures and mechanical equipment were not used to support VIMS piping. VIMS piping was installed with a slope which ensures that any rainwater or condensation within the pipes drains into the ground beneath the slab. Piping located west of the fan slope towards VIMS-4 and VIMS-3, all piping east of the fan slope towards VIMS-1, VIMS-5A, VIMS-5B. VIMS piping was installed along existing walls and does not significantly block access to any areas required by building tenants, or interfere with any light, door, window, or equipment access area.

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[3] The amount of soil removed for each sump varied: VIMS-1 (2.1 cubic feet removed), VIMS-3 (3.3 cubic feet removed), VIMS-4 (3.3 cubic feet removed), VIMS-5A (2.7 cubic feet removed) and VIMS-5B (3.3 cubic feet removed).

3.6.3 VIMS Fan

Based on the results of the initial design testing, a commercial Cincinnati Fan model PB-9 was selected for the entire VIMS. Manufacturer specifications are included in Appendix D. The selected fan was sized to provide the required pressure difference and airflow characteristics necessary to achieve a minimum of 1 Pascal of vaccum across the system.

The fan was mounted on southeastern section of the roof. The fan was mounted on spring insulators to minimize noise and vibration and placed a minimum of 10 feet away from any other opening in the roof. The fan was placed in a watertight protective housing. The VIMS piping was run through a roof penetration and sealed with asphalt-based roofing mastic and flashing. The top of the fan exhaust pipe extends 6.08 feet above the roof.

The fan was wired to dedicated electrical circuits and circuit breaker in the existing electrical box located on the southern internal wall of the Hudson Bay Insulation warehouse. All electrical work was performed by a licensed electrician under the direct oversight of McKinstry Company.

3.6.4 Manometers and Sampling Ports

U-tube manometers were installed into the sides of riser pipes at all VIMS locations to verify system air flow; copies of the manufacturer specifications are included in Appendix D. The manometers were installed approximately 3 to 6 feet above the floor (Figure 1). In general, an observed difference in fluid height between the sides of the U-tube indicates that air is flowing and that VIMS system is working. The difference in the fluid level will be affected by changes in atmospheric pressure but the fluid level should always remain different between each side of the tube.

Two ¼-inch female National Pipe Thread (NPT) vapor sampling ports were installed on the vertical stack above and below the roofline on the Hudson Bay Building.

3.7 Waste Disposal

Soil removed from the sub-slab was containerized (in 55-and 35 gallon drums) and sampled for disposal characterization. The soil was classified as non-hazardous waste and is scheduled for off site disposal by Envirotech Systems. At the time of this report, the laboratory analytical reports are pending. Copies of the certified laboratory analytical reports will be included in the addendum submittal. The addendum will include the certified laboratory analytical reports for soil disposal and confirmation sampling (see Section 4.2).

The small quantity of concrete debris and other waste was considered non-impacted and was placed in the on-site solid waste dumpster for eventual off-site disposal at a solid waste landfill.

3.8 System Labeling

A "Soil Vapor Mitigation System" label was placed on each vertical VIMS riser pipe, and placed on select overhead piping. These labels included ART contact information. A label was also placed on the VIMS circuit breaker.

A Hazardous Warning label was placed on the fan exhaust pipe. The label indicates that only authorized personnel should be near the exhaust fan and that no work should be conducted in the near vicinity of the vent opening without proper air monitoring and PPE.

Photographs of these labels are included in Appendix B.

3.9 Monitoring

A portable vacuum was used to contain the dust generated from concrete boring and soil excavation activities. Vacuum exhaust was vented to outside the building. Noise generation was minimized to the extent practicable and PPE was worn during all construction activities.

RETEC periodically monitored the breathing zone and sump interior VOC concentrations using a photoionization detector (PID) with a 10.6 eV bulb. The maximum value recorded was 0.6 ppm at VIMS-5B below the OSHA permissible exposure limit (Table 1).

4.0 IRM Results

4.1 Performance Testing

Performance testing was completed immediately following VIMS installation to determine if the system met the performance criterion of at least 1 Pascal vacuum across the extent of the slab. Performance testing included the following:

- Measuring baseline pressures at each test hole with the fan de-energized
- Measuring pressures at each testing hole with the fan energized and after the system was allowed to equilibrate for approximately 10 minutes

The results of the performance testing indicated that a negative pressure differential of at least 1 Pascal, measured at each of the test holes after the fan was turned on, was achieved. This shows that the system is effectively working per the design and the system was fully operational when the contractors and RETEC left site on August 6, 2007.

RETEC field staff completed weekly performance monitoring for the six weeks following VIMS installation. During these weekly checks, field personnel observed fluid levels in each side of the "U" shaped manometer tubes to evaluate whether air was moving through the sub-surface. Observations indicated that air was flowing during the first six weekly checks. Copies of performance monitoring field notes are included in Appendix E.

Prior to demobilization from the site, ART inspected the integrity of the fan mounting seals and all joints in the interior and exterior VIMS piping system.

4.2 Confirmation Testing

GE submitted a revised sampling and analysis plan on September 4, which outlined the proposed approach and locations for conformational testing[4]. The conformational testing event is scheduled for November 5, 2007 and will include indoor air sampling, ambient air sampling, exhaust sampling, and air flow measurements. Certified laboratory analytical results and summary tables will be submitted to Ecology as an addendum to this report within 45 days of the sampling event.

4.3 Conclusions

The IRM successfully achieved a minimal pressure differential of at least 1 Pascal across all test holes. The average pressure differential across all test holes was 30 Pascal, which is 30 times greater than the design goal.

Written certification by ART of the system completeness, to the extent that is determined without the results of the indoor air sampling, is included in Appendix F.

[4] Ecology provided comments and contingent approval on this report on September 25, 2007.

5.0 Deviations from the IRM Work Plan

This section of the report summarizes deviations from the IRM Work Plan.

5.1 Diagnostic Testing

Section 2.2.1 of the IRM Work Plan state the following: Prior to diagnostic testing, all floor cracks within the remedial area shall be sealed with an applicable sealant.

On June 1, 2007 all accessible floor cracks within the estimated radius of influence of the proposed sump locations were sealed with polyurethane sealant. Due to the various stockpiled products and permanent fixed structures within the building, the complete floor area associated with the remedial area was not sealed. As summarized in Section 4, the overall pressure reading across the building slab exceeded the minimum design requirements called out in the IRM Work Plan. Because of this reason it was not necessary to go back into the building and seal all of the cracks that were inaccessible in June.

5.2 Conceptual Design

Section 2.1 of the IRM Work Plan stated the following in regards to the final conceptual design: The IRM will conceptually consist of one to four slab penetrations, each fitted with a 4-inch PVC riser VIMS pipe. The pipes will be vented together via a horizontal 6-inch PVC manifold located near the ceiling.

5.2.1 Total Number of Sumps

The VIMS included five separate sump locations, not four as was stated in the IRM Work Plan. The extra sump was added based on the zone of influence determined during initial design testing. Using diagnostic testers and a micro-manometer, ART determined that two sump locations (identified as VIMS-5A and VIMS-5B) were necessary to meet the design goal of a minimum of 1 Pascal of negative pressure across the building slab.

5.2.2 VIMS Piping Diameter

The IRM Work Plan stated that 4-inch PVC and 6-inch PVC would be used in the design. During diagnostic testing, it was determined that the desired zone of influence and flow rates with the selected commercial fan could be achieved using 3-inch and 4-inch pipe instead. The smaller pipe was utilized to reduce the overall system footprint and to save on installation cost.

5.3 Exhaust Pipe location

Section 2.2.2 of the IRM Work Plan states the following: The fan will exhaust vertically through the roof, approximately 24 inches above the roof line. The final exhaust stack location and exhaust stack height were modified to 6 feet 1 inch in accordance with the DOE letter dated May 29, 2007 (Ecology, 2007d).

5.4 Verification of Effectiveness

Pressure readings were measured at each test hole after construction in accordance with the IRM Work Plan to verify the VIMS zone of influence and performance, with the exception of TH-8 No initial reading was taken for TH-8 with the fan in the off position. Data from the 9 other test holes was used to determined the effectiveness of the VIMS.

6.0 Operation and Maintenance

The objectives of the following O&M activities are to:

- Ensure ongoing VIMS operation through scheduled checks;
- Provide repairs to the VIMS when problems arise; and
- Provide a timely response to building occupant concerns related to the VIMS.

6.1 System Inspection and Monitoring

The VIMS was designed and installed as a temporary, but integral addition to the building. The following inspection and monitoring activities should be completed to ensure that the VIMS remains operational and satisfies the design criteria.

6.1.1 Monthly Checks

The U-tube manometers will be checked every month[5] following installation by RETEC field staff. Documentation of the field inspection will include the following:

- Date and time
- Location identification
- Visual inspection and reading of U-tube manometer.

6.1.2 Annual Checks

The VIMS should be inspected annually (every 12 months), or before the building is re-occupied following a time when the building was vacant and the system was turned off.

The annual inspection should include a visual inspection of the complete system, both indoors and outdoors. Any actionable items found during inspections should be addressed immediately, if possible.

Inspection items should include, but not be limited to:

- Recording manometer vacuums;
- Inspecting the fan for mechanical operation, noise, and vibration;
- Inspecting all piping and piping connections (indoors and outdoors);
- Checking for new cracks in walls and floors; and
- Ensuring all piping supports are properly anchored.

Refer to the VIMS Inspection Form (provided in Appendix D) for a complete listing of items to be checked and documented during system inspections.

NOTE: The U-tube manometers located on each vent stack provide a quick check that the system is operating correctly. Building occupants should be advised and know that if the fluid in each side of the manometer is at a different height, then the system is functioning normally. If the fluid elevations are exactly

[5] The monthly checks follow the initial 6 weeks of weekly checks immediately following system installation.

even, then the system may be off (at the fan switch or the circuit breaker) or otherwise not functioning properly. In such instance, the building tenants were instructed to notify ENSR.

Following completion of any inspection or maintenance activities, the inspector should complete a VIMS Inspection Form. Any modifications or repairs performed should be noted on field sketches attached to the Form. The original VIMS Inspection Forms should be kept on file at the site, with a copy faxed to RETEC for their files (fax number 206-624-2839).

Inspection records will be compared to previous inspections to determine whether the system is performing within its acceptable range of operation. If it is determined that the system is not performing within its acceptable range, maintenance may be required.

Operational checks can be conducted by the property occupants or, typically, the facilities manager.

6.2 System Modifications

Keymac and McKinstry have indicated that the Puget Sound Pipe & Supply Office and Warehouse space will be renovated. The new space will be used by the McKinstry office staff located in the building to the north. The renovations are schedule to start in November of 2007 and will extend through January 2008. GE will work directly with Keymac/McKinstry and Ecology to ensure that any needed reconfigurations are done as needed and the system continues to operate to the extent possible considering the construction activities.

7.0 References

Ecology, 2007a. *Department of Ecology Agreed Order Number 4258.* State of Washington Department of Ecology, May 2007.

Ecology 2007b. Department of Ecology letter: Conditional Approval of the GE Sub-Surface Vapor Intrusion Interim Measures Work Plan and Design, Revision 1. Dated January 29, 2007. State of Washington Department of Ecology, February 23, 2007.

Ecology 2007c. Department of Ecology letter re: Ecology Response and Comments to Agreed Order Technical Memorandum No. 1 and Sampling and Analysis Plan, dated May 14, 2007. State of Washington Department of Ecology, May 29, 2007.

Ecology 2007d. Department of Ecology letter re: Ecology Response and Comments to Agreed Order DE-4528 Technical Memorandum No. 2, dated May 18, 2007. State of Washington Department of Ecology, May 29, 2007.

Ecology 2007e. Department of Ecology letter re: Time Extension Approval. State of Washington Department of Ecology, June 5, 2007.

Ecology 2007f. Department of Ecology letter re: Time Extension Approval. State of Washington Department of Ecology, July 2007.

Ecology 2007g. Department of Ecology letter re: Washington State Department of Ecology Response and Approval of the Vapor Intrusion Mitigation System Installation. State of Washington Department of Ecology, August 15, 2007.

Ecology 2007h. Department of Ecology letter dated September 25, 2007 re: Contingent Approval of Revised Draft Sampling and Analysis Plan. State of Washington Department of Ecology, September 4, 2007.

GE 2007a. GE Aviation letter re: Deadline Extension Pursuant to Section VII.J of Agreed Order # DE 4258. GE Aviation, May 31, 2007.

GE 2007b. GE Aviation letter re: Deadline Extension Pursuant to Section VII.J of Agreed Order # DE 4258. GE Aviation, July 6, 2007.

RETEC, 2007a. *Sub-Surface Vapor Intrusion Interim Measures Work Plan and Design (Work Plan).* The RETEC Group, Inc, January 29, 2007, Revision 1.

RETEC 2007b. *Technical Memorandum No. 1 and Sampling and Analysis Plan.* The RETEC Group, Inc, May 14, 2007

RETEC 2007c. *Technical Memorandum No. 2.* The RETEC Group, Inc, May 18, 2007

RETEC 2007d. *Technical Memorandum No. 3.* ENSR, July 24, 2007

RETEC 2007e. *Sampling and Analysis Plan – Vapor Intrusion Mitigation Interim Action.* ENSR, September 4, 2007, Revision 1.

Tables

Table 1: Summary of PID Results

Field Measurement for GE Dawson Sub-Surface Vapor Intrusion - Interim Measures

Location	PID reading (ppm)
VIMS-1	0.0
VIMS-3	0.0
VIMS-4	0.0
VIMS-5A	0.6
VIMS-5B	0.0

Notes:

1. RETEC periodically monitored the VOC concentration within the breathing zone area using a Multi-RAE photoionization detector (PID) with an 10.6 eV bulb. PID readings were taken during maximum soil disturbance while excavating each sump location. LEL levels were 0.0 for the entire field work duration. The action levels outlined in the site-specific Health and Safety Plan were not exceeded.

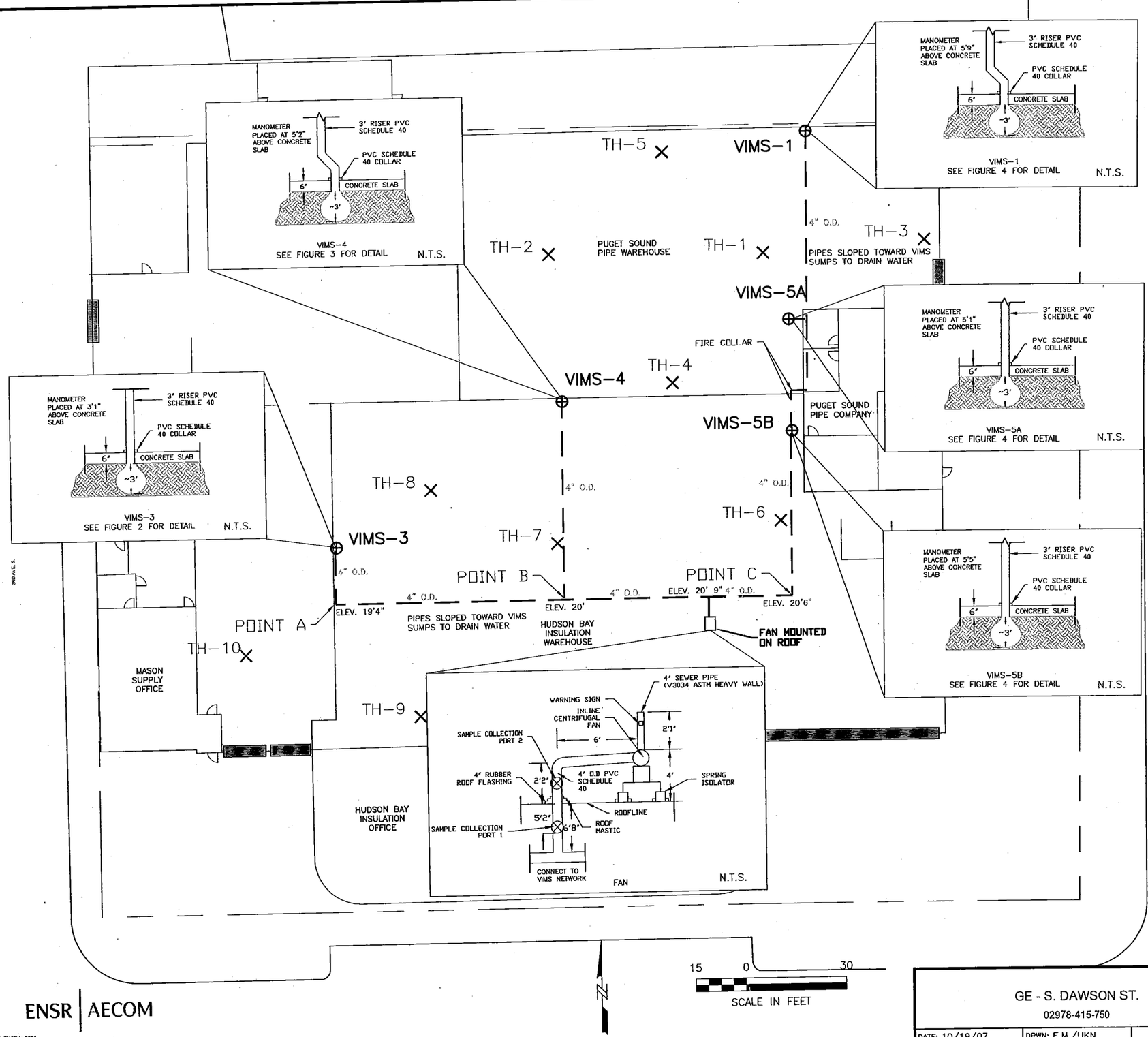
Table 2: Summary of Diagnostic and Performance Testing

Field Measurement for GE Dawson Sub-Surface Vapor Intrusion - Interim Measures

	Pre-Installation Pressure Static H_2O Pressure - 4"			Post-Installation Pressure Static H_2O Pressure - 5"			
	Fan On	Fan On	Fan Off	**Fan On**	**Fan On**	**Fan Off**	**Fan Off**
Units	Inches of H2O	Pascal	Inches of H2O	**Inches of H2O**	**Pascal**	**Inches of H2O**	**Pascal**
TH-1	-0.342	-85.158	NR	**-0.372**	**-92.628**	**0.013**	**3.237**
TH-2	-0.018	-4.482	NR	**-0.014**	**-3.486**	**0.010**	**2.49**
TH-3	-0.041	-10.209	NR	**-0.042**	**-10.458**	**0.011**	**2.739**
TH-4	-0.141	-35.109	NR	**-0.226**	**-56.274**	**0.000**	**0**
TH-5	-0.097	-24.153	NR	**-0.102**	**-25.398**	**0.012**	**2.988**
TH-6	-0.041	-10.209	NR	**-0.036**	**-8.964**	**-0.004**	**-0.996**
TH-7	-0.015	-3.735	NR	**-0.024**	**-5.976**	**-0.002**	**-0.498**
TH-8	-0.108	-26.892	NR	**-0.179**	**-44.571**	**NR**	**NR**
TH-9	-0.055	-13.695	NR	**-0.091**	**-22.659**	**0.000**	**0**
TH-10	-0.105	-26.145	NR	**-0.118**	**-29.382**	**0.008**	**1.992**

Note:
1. Pre Installation data was taken during diagnostic testing from 6-1-07 to 6-7-07.
2. Post Installation data was taken after the full system was installed on 8-6-07
3. 1 Inch of H20 = 249 Pascal
4. Section 2.2.3 of Work Plan required a negative pressure differential of at least 1 Pascal
5. NR - No reading taken

Figures



NOTES:

1. ALL 4" SEWER PIPE IS V3034 ASTM HEAVY WALL WITH THE EXCEPTION OF THE EXTERNAL FAN PIPING. PLEASE SEE INSERT FOR DETAILS.
2. ALL PIPING ELEVATIONS ARE MEASURED FROM THE TOP OF THE CONCRETE FLOOR.
3. ALL RISER PIPES TERMINATE AT THE FLOOR COLLAR.
4. LOCATIONS ARE APPROXIMATE.
5. N.T.S. = NOT TO SCALE
6. ELECTRICAL BOX IS LOCATED ON THE SOUTHERN INTERIOR HUDSON BAY WAREHOUSE WALL.

LEGEND

- PROPERTY LINE
- INTERIOR DUCT WORK
- SUMP LOCATION
- BAY DOOR OPENING
- APPROXIMATE TEST HOLE LOCATION

ENSR | AECOM

Merged with ENSR in 2007
RETEC

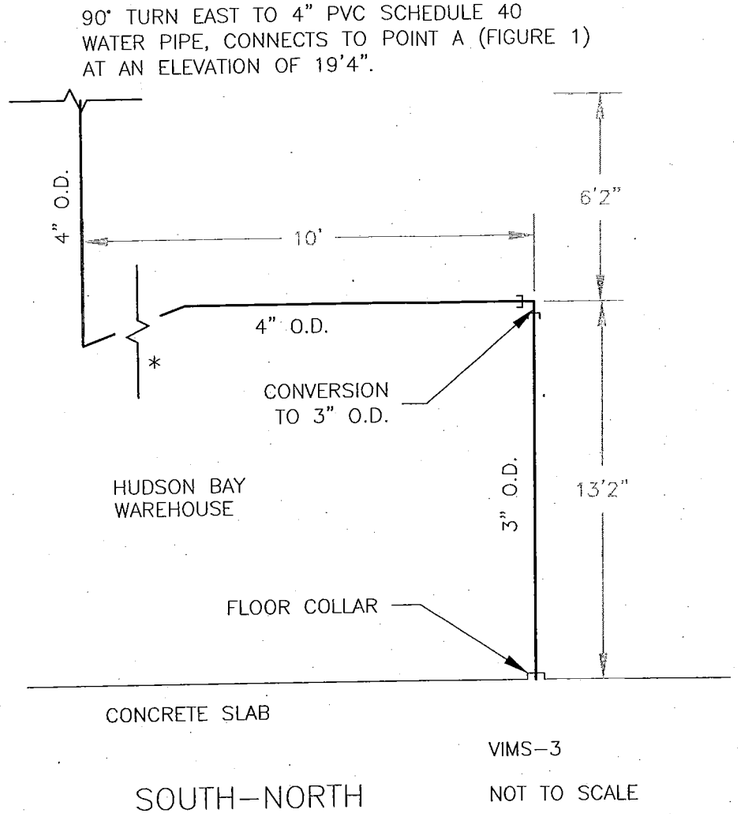
GE - S. DAWSON ST.
02978-415-750

DATE: 10/19/07 | DRWN: E.M./UKN

SUB-SLAB DEPRESSURIZATION SYSTEM

FIGURE 1

File: H:\GE-S.Dawson\19314S144-D.dwg Layout: FIG 1 (11x17) User: emarshall Plotted: Oct 19, 2007 - 1:15pm , Xref's:



VIMS–3

NOT TO SCALE

NOTES:

1. ALL 4" PIPE IS SEWER PIPE (V3034 ASTM HEAVY WALL) WITH THE EXCEPTION OF THE FAN PIPES. PLEASE SEE INSERT FOR DETAILS.
2. ALL 3" PIPE, ELBOWS AND CONNECTORS ARE PVC SCHEDULE 40 PIPE.
3. ALL MEASUREMENTS ARE ABOVE THE CONCRETE SLAB.
4. ALL RISER PIPES TERMINATE AT THE FLOOR COLLAR.
5. LOCATIONS ARE APPROXIMATE.
6. PLEASE SEE FIGURE 1 FOR PIPE RUN.
7. SAMPLE PORTS AND MANOMETER LOCATIONS ARE SHOWN ON FIGURE 1.
8. PIPE SYSTEM RUNS APPROXIMATELY 4" FROM INTERNAL PLYWOOD WALL BETWEEN HUDSON BAY & MASON SUPPLY.

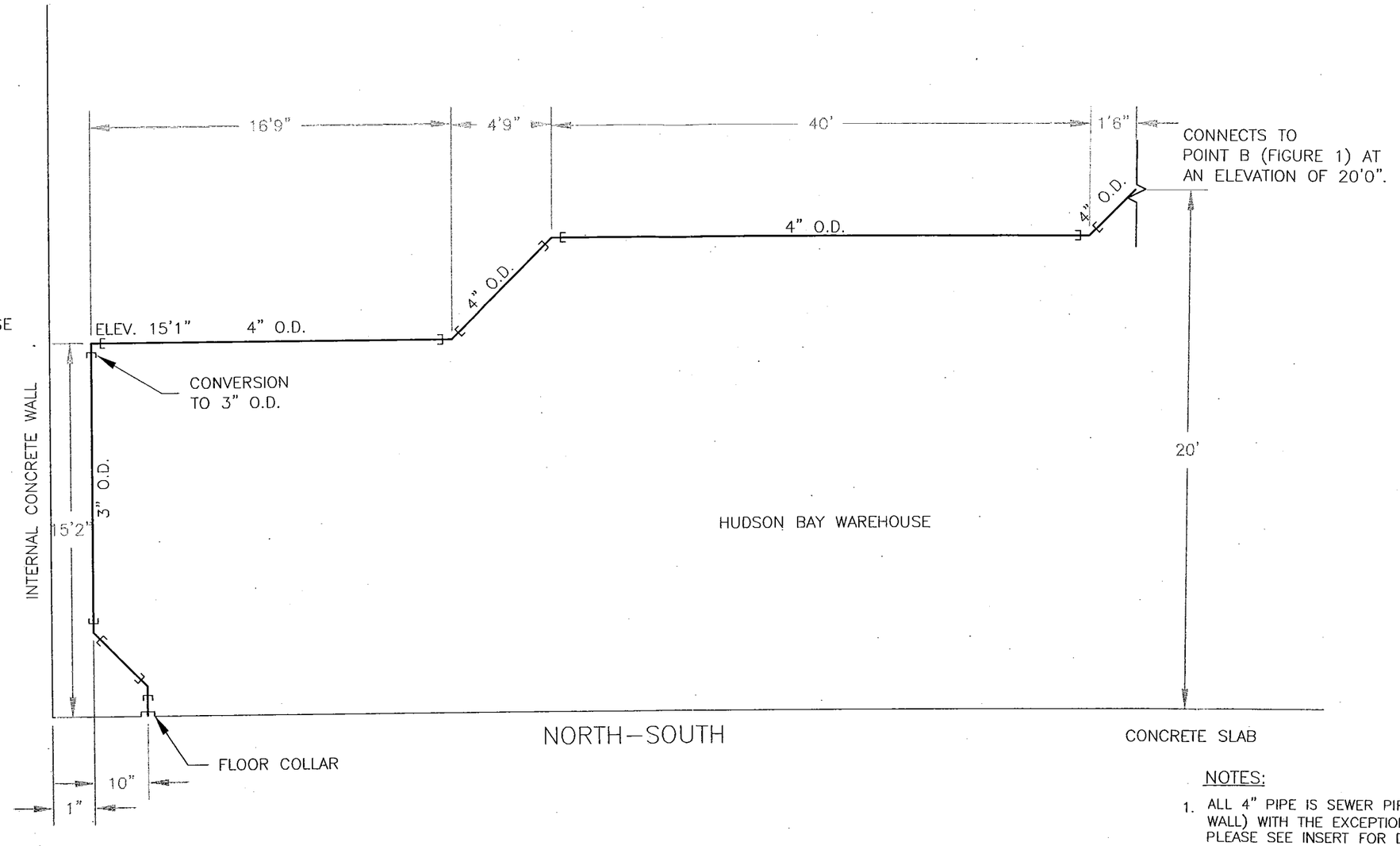
* PIPE SYSTEM CONSTRUCTED AROUND INTERNAL WALL AT THIS POINT AND IS 1'6" IN LENGTH.

ENSR | AECOM

Merged with ENSR in 2007
RETEC

GE - S. DAWSON ST. 02978-415-750			VIMS-3 SECTION DETAIL
DATE: 8/21/07	DRWN: E.M./SEA		FIGURE 2

File: H:\19314\19314-pipe-section-views(B).dwg Layout: FIG 2 User: emarshall Plotted: Aug 21, 2007 - 3:44pm Xref's:



VIMS–4

NOT TO SCALE

NOTES:

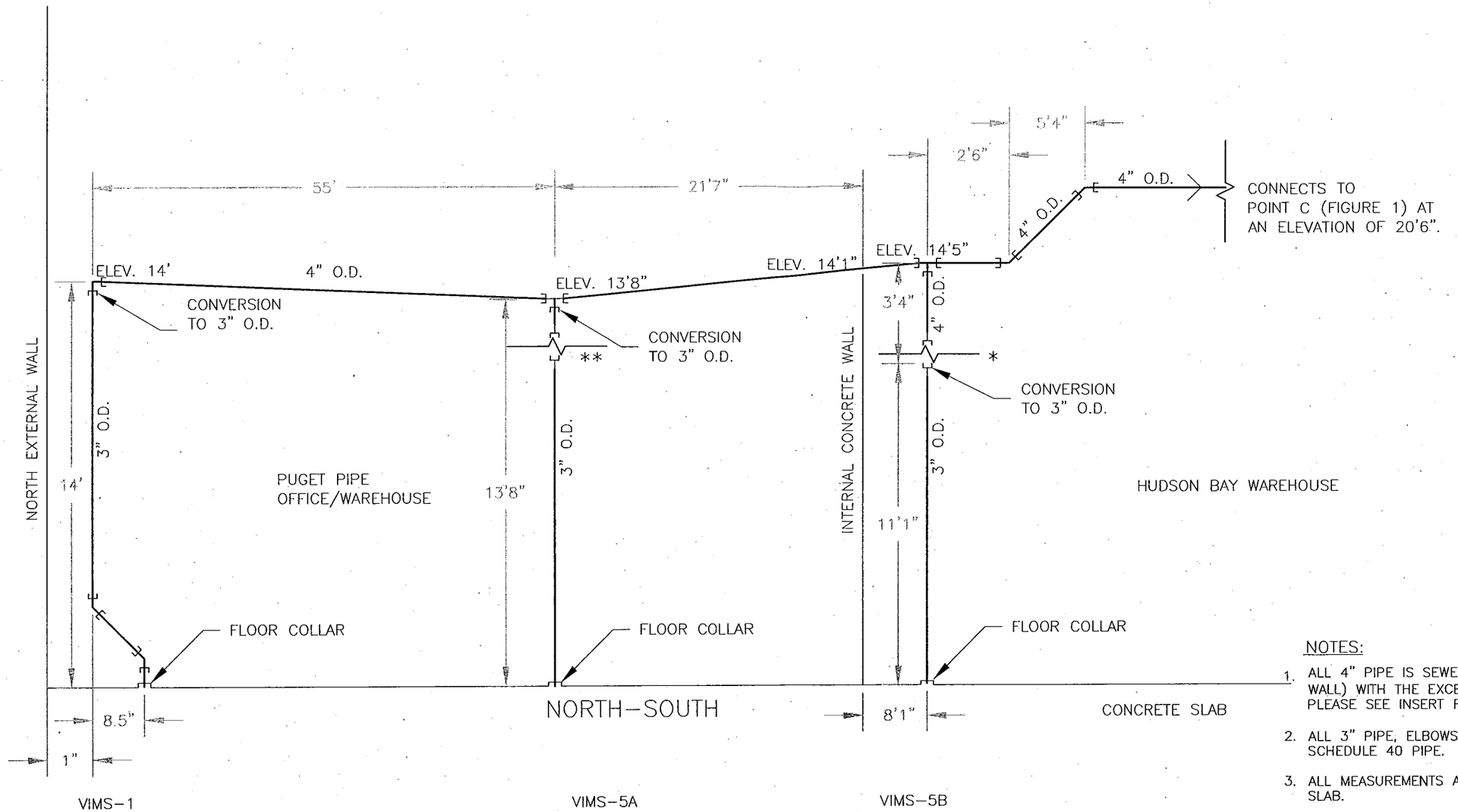
1. ALL 4" PIPE IS SEWER PIPE (V3034 ASTM HEAVY WALL) WITH THE EXCEPTION OF THE FAN PIPES. PLEASE SEE INSERT FOR DETAILS.
2. ALL 3" PIPE, ELBOWS AND CONNECTORS ARE PVC SCHEDULE 40 PIPE.
3. ALL MEASUREMENTS ARE ABOVE THE CONCRETE SLAB.
4. ALL RISER PIPES TERMINATE AT THE FLOOR COLLAR.
5. LOCATIONS ARE APPROXIMATE.
6. PLEASE SEE FIGURE 1 FOR PIPE RUN.
7. SAMPLE PORTS AND MANOMETER LOCATIONS ARE SHOWN ON FIGURE 1.

ENSR | AECOM

Merged with ENSR in 2007
RETEC

GE - S. DAWSON ST. 02978-415-750			**VIMS-4** **SECTION DETAIL**
DATE: 8/15/07	DRWN: E.M./SEA		**FIGURE 3**

File: H:\19314\19314-pipe-section-views(B).dwg Layout: FIG 3 User: emarshall Plotted: Aug 21, 2007 - 3:25pm Xref's:



NOTES:

1. ALL 4" PIPE IS SEWER PIPE (V3034 ASTM HEAVY WALL) WITH THE EXCEPTION OF THE FAN PIPES. PLEASE SEE INSERT FOR DETAILS.
2. ALL 3" PIPE, ELBOWS AND CONNECTORS ARE PVC SCHEDULE 40 PIPE.
3. ALL MEASUREMENTS ARE ABOVE THE CONCRETE SLAB.
4. ALL RISER PIPES TERMINATE AT THE FLOOR COLLAR.
5. LOCATIONS ARE APPROXIMATE.
6. PLEASE SEE FIGURE 1 FOR PIPE RUN.
7. SAMPLE PORTS AND MANOMETER LOCATIONS ARE SHOWN ON FIGURE 1.

* PIPE EXTENDS 8" TO THE WEST.

** PIPE EXTENDS 11" TO THE EAST.

ENSR | AECOM

Merged with ENSR in 2007
RETEC

GE - S. DAWSON ST. 02978-415-750	**VIMS-1, VIMS 5A, VIMS-5B SECTION DETAIL**
DATE: 8/21/07 | DRWN: E.M./SEA	**FIGURE 4**

File: H:\19314\19314-pipe-section-views(B).dwg Layout: FIG 4 User: emarshall Plotted: Aug 21, 2007 - 3:33pm Xref's:

Appendix A

Information Package

GE
Aviation

James W. Sumner, Manager
Group Environmental Programs

One Neumann Way, M/D T165
Cincinnati, OH 45215

T 513-672-3986, DC 8*892-3986
F 513 552-8918, DC 8*892-8918
jim.sumner@ge.com

August 24, 2007

Mr. Dean Yasuda
Washington Department of Ecology
Northwest Regional Office
3190 – 160th Avenue S.E.
Bellevue, Washington 98008-5452

Dear Mr. Yasuda:

As required by Agreed Order # DE 4258, Section VII, F. enclosed please find a copy of the Information Package sent to the following;

- Mr. Bill Teplicky, McKinstry – Building Owner
- Steve Weber, Puget Sound Pipe & Supply – Tenant
- Tom Merriman, Mason Supply Company – Tenant
- James King, Hudson Bay Insultation - Tenant

Should you have any questions please do not hesitate to call me at (513) 672-3986 or Jamie Stevens at (206) 624-9349.

Sincerely,

James W. Sumner

Attachment – Information Package

cc: Julie Selick, DOE
Jamie Stevens, Linda Baker – RETEC

The RETEC Group, Inc.
1011 SW Klickitat Way, Suite 207, Seattle, WA 98134-1162
T 206.624.9349 F 206.624.2839 www.ensr.aecom.com

Memorandum

Date: August 22, 2007

To: Bill Teplicky - McKinstry

From: Jamie Stevens

Subject: Information Package for 220 S Dawson Street Building

Overview

As a part of the Agreed Order between GE and the Department of Ecology we are providing this information package to provide an overview of the recently installed Vapor Intrusion Mitigation System (VIMS).

What is a Sub-Surface Vapor Intrusion Mitigation System?

The purpose of VIMS is to minimize migration of vapors from below the building to inside the building. This is achieved by actively extracting air from one or more pits constructed below the slab through a piping network connected an inline centrifugal fan. Extracting the air not only removes vapors, but also decreases the pressure under the slab so that it is lower than inside the building. This negative pressure gradient reduces air flow upward through the slab. The air extracted by the fan discharges to the atmosphere.

Systems similar to this are used around the country at both commercial and residential sites for a wide variety of VOCs that migrate through soil largely by diffusion. Similar systems are also commonly used to control radon gas infiltration (common in Western Washington and the Northeast).

Details of the 220 South Dawson Street VIMS

VIMS construction was completed on August 6, 2007 by Advance Radon Technology (ART) with direct oversight from RETEC and Ecology. All work was completed as specified in the Work Plan[1], relevant letters from Ecology[2], and in accordance with all relevant standards and requirements.

---

[1] Sub-Surface Vapor Intrusion – Interim Measures Work Plan and Design, Revision 1. Prepared by The RETEC Group, Inc. January 29, 2007.

[2] February 23, 2007; May 29, 2007 (2 separate letters with the same date); May 31, 2007; June 5, 2007; and July 10, 2007

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The VIMS systems consists of five separate pits, each connected to a 3" schedule 40 PVC pipe riser which extends up from the concrete slab to the roof. Two risers are located in the northwest portion of the building and three are located in the southwest portion of the building. These locations were determined by Ecology and corresponded to sampling locations where elevated concentrations of TCE were detected in the sub-slab vapors and indoor air. Each riser is connected to piping routed to a single, roof-mounted centrifugal fan that extracts the air from under the building foundation. The extracted air is vented through a stack located on the southwest portion of the roof. No end of stack treatment is required; all potential concentrations are below permissible limits set by the local air regulator agency[3].

U-tube manometers were installed into the sides of riser pipes at all VIMS locations to verify system air flow. The manometers were installed approximately 4 feet above the floor (heights vary depending on location, please see Figure 1). In general, an observed difference in fluid height between the sides of the U-tube indicates that air is flowing and that VIMS system is working. The difference in the fluid level will be affected by changes in atmospheric pressure but the fluid level should always remain different between each side of the tube. Figures 1 through 4 (attached) depict the configuration and construction details of VIMS and related equipment, including the fan, manometers, and the electrical service box.

Verification of Performance

The U-tube manometers will be checked every week for the first six weeks starting the week of August 13 through the week of September 17, and every month thereafter by RETEC field staff. Documentation of the field inspection will be submitted to Ecology and copies will be provided to McKinstry representatives.

Upon notification by Ecology air sampling will be conducted similar to the sampling in the past. Results of this sampling will be submitted to Ecology, copies will be provided to McKinstry.

Stack testing will also be collected at the same time as the indoor and outdoor air sampling events. One sample will be collected from the exhaust piping connecting to the discharge fan. Results of this sampling will be submitted to Ecology; copies will be provided to McKinstry.

Performance Period

The VIMS is required to operate continuously until Ecology determines that the system may be terminated.

What to do if you have questions, an emergency, or need to change existing conditions at the site?

If representatives of McKinstry or any of the building tenants have any questions or concerns, or if unusual operation of the system is observed, please see the tables below for contact information.

[3] Puget Sound Clean Air Agency

The RETEC Group, Inc.
1011 SW Klickitat Way, Suite 207, Seattle, WA 98134-1162
T **206.624.9349** F **206.624.2839** www.ensr.aecom.com

Contact	Company	Phone and Email	Mailing Address
Jamie Stevens – ENSR Project Manager	RETEC/ENSR	Phone: 206-624-9349 Email: jstevens@ensr.aecom.com	1011 S.W. Klickitat Way, Suite 207 Seattle WA 98134
James Sumner – GE Project Manager	GE Aviation	Phone: 513-672-3986 Email: jim.sumner@ge.com	One Neumann Way M\D T165 Cincinnati, Ohio 45215

Any questions to the Department of Ecology should be directed to:

Contact	Company	Phone and Email	Mailing Address
Dean Yasuda – Ecology Site Manager	Department of Ecology – Northwest Regional Office	Phone: 425-649-7262 Email: DYAS461@ECY.WA.GOV	3190 160th Ave SE Bellevue, WA 98008

System operation requires no action by the representatives of McKinstry; however, potential modifications to the building could affect the performance of the VIMS. GE requests that representatives of McKinstry contact GE (or any of the contacts listed above) and Ecology immediately if any of the following types of modifications are planned or occur at the building:

- Changes to the Heating/Venting systems (including additional roof units)
- Changes to the concrete slab, internal walls, or any penetrations to external walls
- Changes to the building foot print
- Changes to any electrical work which could affect the current electrical control box location for the fan.

Additionally, GE requests that representatives of McKinstry and building tenants contact RETEC/ENSR or any of the contacts listed above immediately if any of the following damages or potential defects to the VIMS are observed:

- Damage to any of the pipes associated with the VIMS network
- If at any time the fan is unusually noisy, excessive vibration, not operating or if a circuit breaker is tripped
- If any unusual sounds, such as knocking or water running, are heard emanating from inside the pipes
- If the manometers appear to be malfunctioning or are damaged (i.e. fluid level equal).

The RETEC Group, Inc.
1011 SW Klickitat Way, Suite 207, Seattle, WA 98134-1162
T 206.624.9349 F 206.624.2839 www.ensr.aecom.com

The fan and the exhaust stack are located on the southeast portion of the roof, above the Hudson Supply Warehouse space (see Figure 1). The fan specifications are attached for your reference. The top of the stack is 6'1" above the roofline and is labeled with warning signs indicating that proper PPE may be required for working within the immediate vicinity of the unit. If work is required on the roof in close proximity to the fan and for extended duration, McKinstry can request that the fan be turned off for the duration of the work. This request should be submitted to and approved by Ecology. PPE can be worn to allow extended work time if concentrations of TCE are above the NIOSH and OSHA permissible limits (as determined by the air monitoring). The most current permissible levels can be found at the National Institute for Occupational Safety and Health website: http://www.cdc.gov/niosh/npg/

Summary

We appreciate the corporation of McKinstry through the installation process. We are happy to provide any additional support or information upon request.

Sincerely yours,

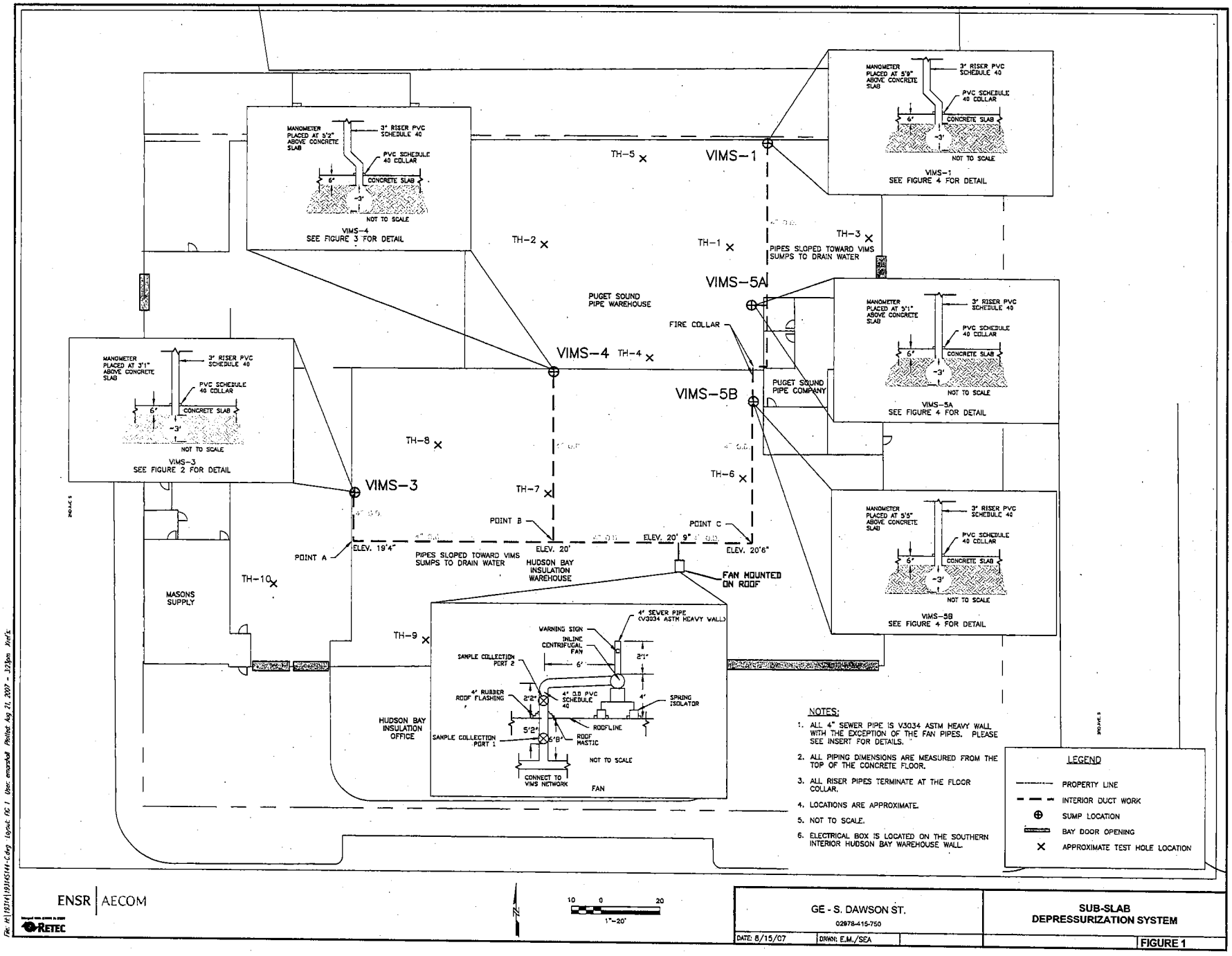
for

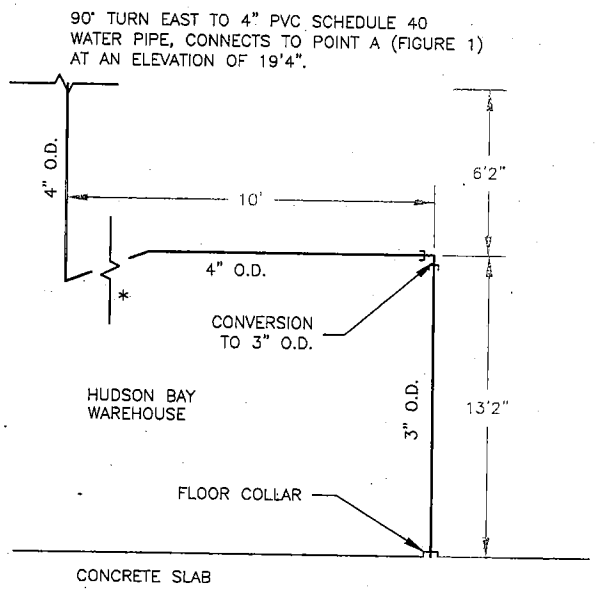
Jamie C. Stevens
Project Manager

for

Mark Havighorst, P.E.
Sr. Project Engineer

Attachments: Figures 1 through 4
Fan Specifications


MANOMETER PLACED AT 5'2" ABOVE CONCRETE SLAB
3" RISER PVC SCHEDULE 40
PVC SCHEDULE 40 COLLAR
6"
CONCRETE SLAB
-3"
NOT TO SCALE
VIMS-4
SEE FIGURE 3 FOR DETAIL
MANOMETER PLACED AT 5'9" ABOVE CONCRETE SLAB
VIMS-1
SEE FIGURE 4 FOR DETAIL
TH-5
VIMS-1
TH-2
TH-1
TH-3
PIPES SLOPED TOWARD VIMS SUMPS TO DRAIN WATER
VIMS-5A
PUGET SOUND PIPE WAREHOUSE
FIRE COLLAR
MANOMETER PLACED AT 3'1" ABOVE CONCRETE SLAB
VIMS-4
TH-4
VIMS-5B
PUGET SOUND PIPE COMPANY
MANOMETER PLACED AT 5'1" ABOVE CONCRETE SLAB
VIMS-5A
SEE FIGURE 4 FOR DETAIL
VIMS-3
SEE FIGURE 2 FOR DETAIL
TH-8
TH-7
TH-6
VIMS-3
POINT A
ELEV. 19'4"
POINT B
ELEV. 20'
POINT C
ELEV. 20' 9"
ELEV. 20'6"
PIPES SLOPED TOWARD VIMS SUMPS TO DRAIN WATER
HUDSON BAY INSULATION WAREHOUSE
FAN MOUNTED ON ROOF
MANOMETER PLACED AT 5'5" ABOVE CONCRETE SLAB
VIMS-5B
SEE FIGURE 4 FOR DETAIL
TH-10
MASONS SUPPLY
TH-9
4" SEWER PIPE (V3034 ASTM HEAVY WALL)
WARNING SIGN
INLINE CENTRIFUGAL FAN
SAMPLE COLLECTION PORT 2
4" RUBBER ROOF FLASHING
4" O.D PVC SCHEDULE 40
SPRING ISOLATOR
ROOFLINE
ROOF MASTIC
SAMPLE COLLECTION PORT 1
CONNECT TO VIMS NETWORK
NOT TO SCALE
FAN
HUDSON BAY INSULATION OFFICE
NOTES:
1. ALL 4" SEWER PIPE IS V3034 ASTM HEAVY WALL WITH THE EXCEPTION OF THE FAN PIPES. PLEASE SEE INSERT FOR DETAILS.
2. ALL PIPING DIMENSIONS ARE MEASURED FROM THE TOP OF THE CONCRETE FLOOR.
3. ALL RISER PIPES TERMINATE AT THE FLOOR COLLAR.
4. LOCATIONS ARE APPROXIMATE.
5. NOT TO SCALE.
6. ELECTRICAL BOX IS LOCATED ON THE SOUTHERN INTERIOR HUDSON BAY WAREHOUSE WALL.
LEGEND
PROPERTY LINE
INTERIOR DUCT WORK
SUMP LOCATION
BAY DOOR OPENING
APPROXIMATE TEST HOLE LOCATION
ENSR | AECOM
RETEC
10 0 20
1"=20'
GE - S. DAWSON ST.
02978-415-750
DATE: 8/15/07
DRAWN: E.M./SEA
SUB-SLAB DEPRESSURIZATION SYSTEM
FIGURE 1



NOTES:

1. ALL 4" PIPE IS SEWER PIPE (V3034 ASTM HEAVY WALL) WITH THE EXCEPTION OF THE FAN PIPES. PLEASE SEE INSERT FOR DETAILS.
2. ALL 3" PIPE, ELBOWS AND CONNECTORS ARE PVC SCHEDULE 40 PIPE.
3. ALL MEASUREMENTS ARE ABOVE THE CONCRETE SLAB.
4. ALL RISER PIPES TERMINATE AT THE FLOOR COLLAR.
5. LOCATIONS ARE APPROXIMATE.
6. PLEASE SEE FIGURE 1 FOR PIPE RUN.
7. SAMPLE PORTS AND MANOMETER LOCATIONS ARE SHOWN ON FIGURE 1.
8. PIPE SYSTEM RUNS APPROXIMATELY 4" FROM INTERNAL PLYWOOD WALL BETWEEN HUDSON BAY & MASON SUPPLY.

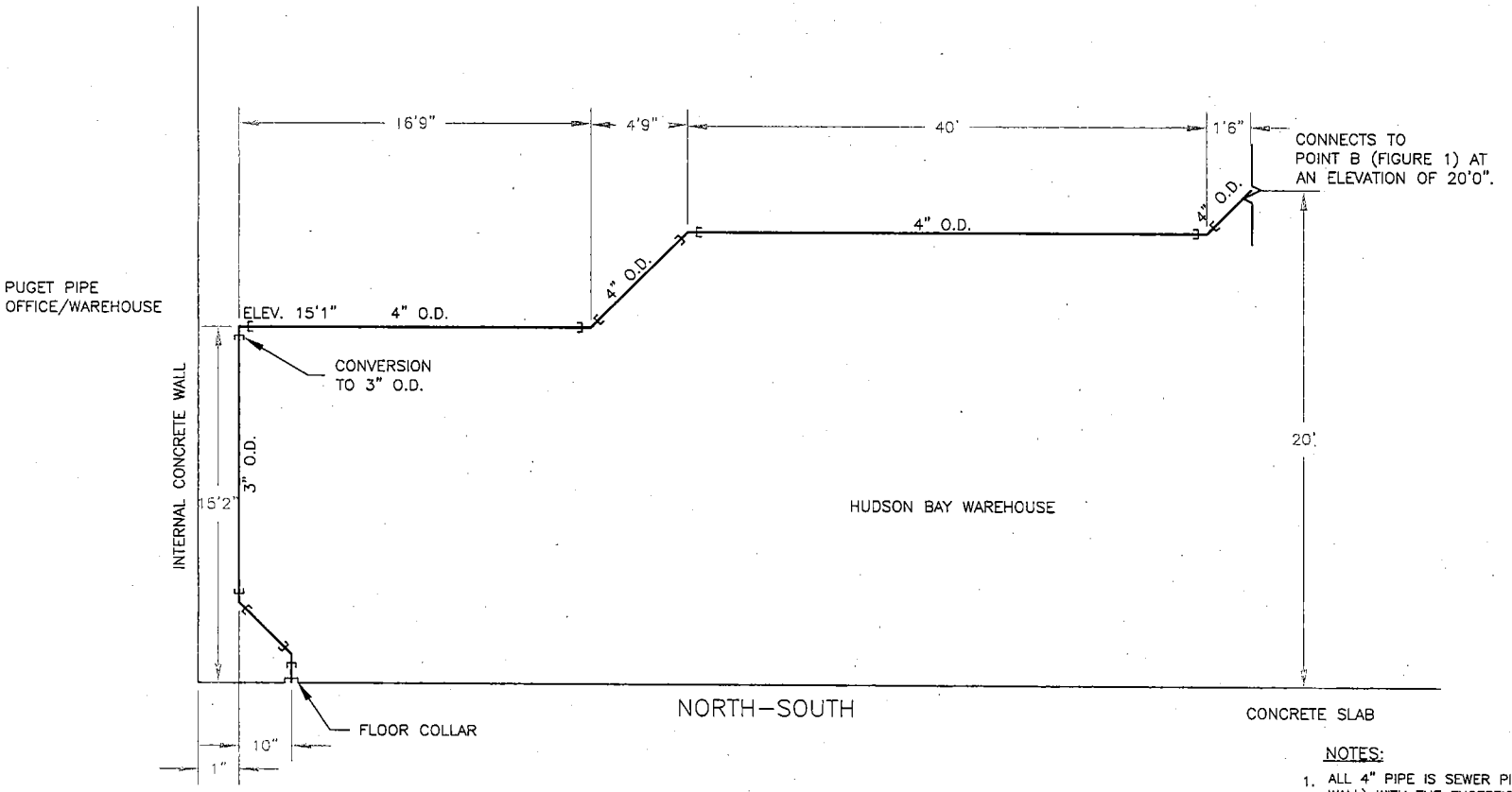
* PIPE SYSTEM CONSTRUCTED AROUND INTERNAL WALL AT THIS POINT AND IS 1'6" IN LENGTH.

ENSR | AECOM

RETEC

GE - S. DAWSON ST. 02978-415-750			VIMS-3 SECTION DETAIL
DATE: 8/21/07	DRWN: E.M./SEA		FIGURE 2

File: H:\19314\19314-pipe-section-views(B).dwg Layout: FIG 2 User: emarshall Plotted: Aug 21, 2007 - 3:44pm Xref's:



VIMS–4

NOT TO SCALE

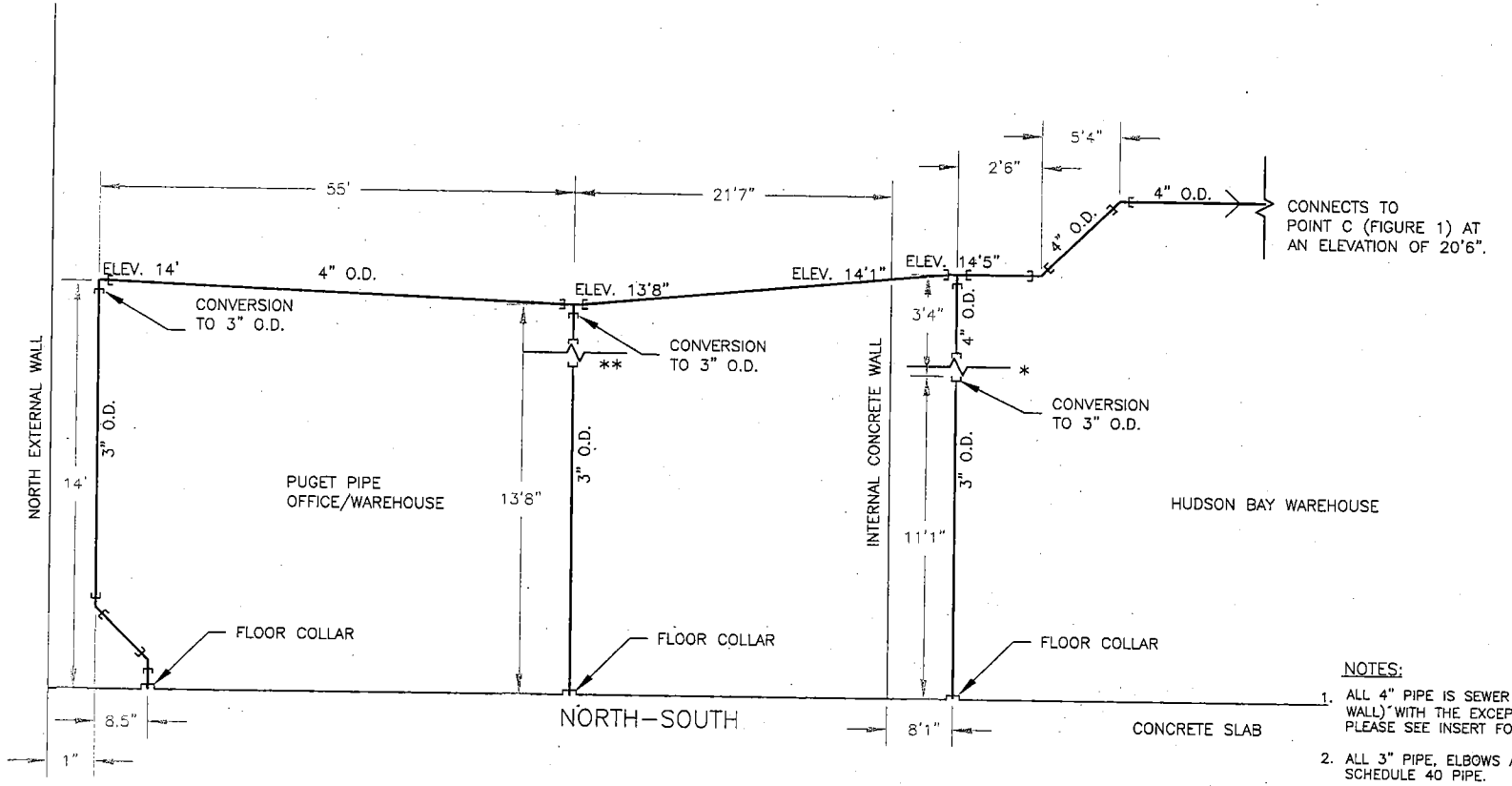
NOTES:

1. ALL 4" PIPE IS SEWER PIPE (V3034 ASTM HEAVY WALL) WITH THE EXCEPTION OF THE FAN PIPES. PLEASE SEE INSERT FOR DETAILS.
2. ALL 3" PIPE, ELBOWS AND CONNECTORS ARE PVC SCHEDULE 40 PIPE.
3. ALL MEASUREMENTS ARE ABOVE THE CONCRETE SLAB.
4. ALL RISER PIPES TERMINATE AT THE FLOOR COLLAR.
5. LOCATIONS ARE APPROXIMATE.
6. PLEASE SEE FIGURE 1 FOR PIPE RUN.
7. SAMPLE PORTS AND MANOMETER LOCATIONS ARE SHOWN ON FIGURE 1.

ENSR | AECOM

RETEC

GE - S. DAWSON ST. 02978-415-750		VIMS-4 SECTION DETAIL
DATE: 8/15/07	DRWN: E.M./SEA	FIGURE 3



NOTES:

1. ALL 4" PIPE IS SEWER PIPE (V3034 ASTM HEAVY WALL) WITH THE EXCEPTION OF THE FAN PIPES. PLEASE SEE INSERT FOR DETAILS.
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4. ALL RISER PIPES TERMINATE AT THE FLOOR COLLAR.
5. LOCATIONS ARE APPROXIMATE.
6. PLEASE SEE FIGURE 1 FOR PIPE RUN.
7. SAMPLE PORTS AND MANOMETER LOCATIONS ARE SHOWN ON FIGURE 1.

* PIPE EXTENDS 8" TO THE WEST.

** PIPE EXTENDS 11" TO THE EAST.

ENSR | AECOM

RETEC

GE - S. DAWSON ST. 02978-415-750	VIMS-1, VIMS 5A, VIMS-5B SECTION DETAIL
DATE: 8/21/07 DRWN: E.M./SEA	FIGURE 4

File: H:\19314\19314-pipe-section-views[B].dwg Layout: FIG 4 User: emarshall Plotted: Aug 21, 2007 - 3:33pm Xref's:

cincinnati fan
OEM and Industrial Air Handling Specialist

FAN SELECTION And PERFORMANCE

Friday, June 08, 2007

Job Name: NORTHWEST COMMERCIAL AIR, INC.
Reference: DOE Seattle Quote: 96373

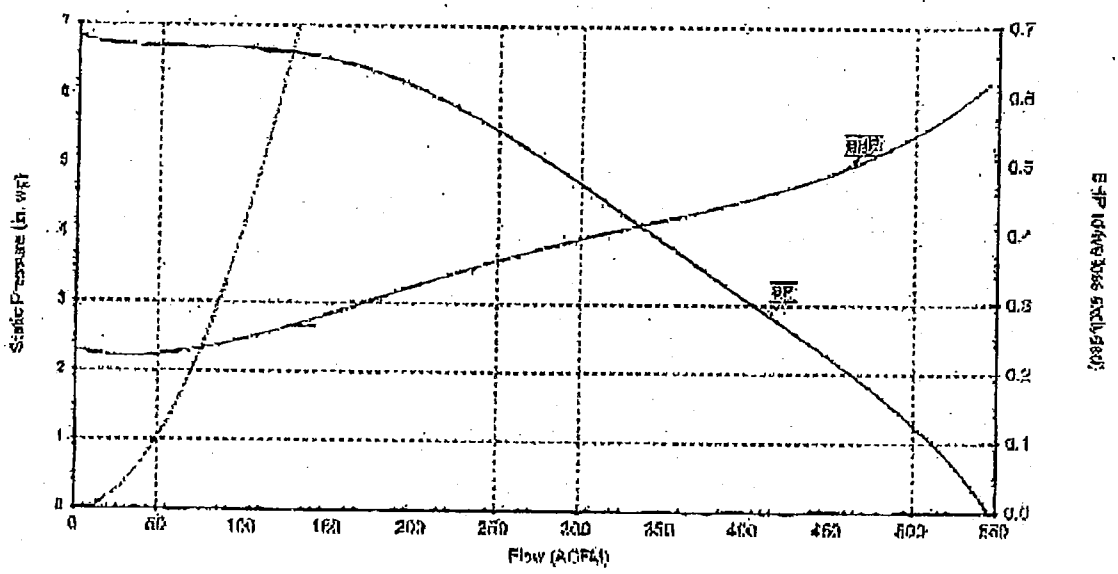
Operating Requirements

Volume, ACFM	125
Static Pressure, in. wg	6.5
Density, lb./ft.³	0.075
Operating Temperature, °F	70
AMCA Arrangement No.	4
Motor Frequency, Hz	60
Start-Up Temperature, °F	70

Fan Selection and Specifications

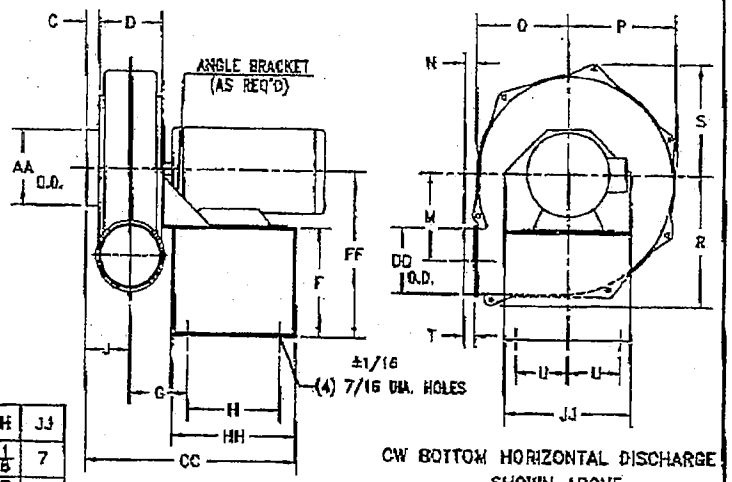
Model	PB-9
Fan RPM	3,450
Wheel Description	Cast Alum. 10-1/4 X 3 BC
Wheel Width, %	100%
Wheel Diameter, in.	10.25
Inlet Diameter, in.	5.00
Outlet Velocity, ft./min.	1,446
Fan BHP	0.27
Static Efficiency, %	49.6%
Cold Start BHP	0.27
Construction Class	N/A

Cincinnati Fan PB-9 Cast Alum. 10-1/4 X 3 BC Wheel (Full Width) @ 3,450 RPM
Rating Point- 125 ACFM @ 6.5 in. wg SP, 0.075 lb./ft.³ Density, 0.27 BHP, 5.0 in. Inlet



CFSWin Version: 7.2.2713.25601 Database Version: 7.2.1

A PB4



CW BOTTOM HORIZONTAL DISCHARGE SHOWN ABOVE

MODEL	FRAME	HOUSING C	D	J	M	N	O	P	R	S	T	AA	DD	F	G	H	U	CC	FF	HH	JJ
PB-8	56	1	3 3/4	2 7/8	4 1/8	1 1/8	4 5/8	5 5/8	7 3/16	4 7/8	1 1/8	4	4	5	3 3/16	5	2 3/4	12 1/8	8 5/16	7 1/8	7
PB-9	56	1 1/16	4 1/8	3 1/8	5 5/8	1 3/16	6 1/8	7 3/8	8 1/2	6 5/8	1	5	4	6 7/8	3 3/8	5 3/4	2 3/4	13 5/16	10 7/16	7 7/8	7
	143T-145T													8 1/4	4 3/16	5	3 3/4	13 5/16	11 7/16	8	9
PB-10A	56	1 1/4	4 1/4	3 3/8	6 9/16	1	6 7/8	9 7/16	10 3/16	7 13/16	1	6	5	6 7/8	3 7/16	5 3/4	2 3/4	13 1/16	10 7/16	7 7/8	7
	143T-145T													8 1/4	4 1/4	5	3 3/4	14 1/8	11 7/8	8	9
PB-12A	56	1 1/4	5	3 3/4	7 9/16	7/8	8	9 5/8	11 11/16	9 7/16	1	7	6	8 1/4	4 1/4	5	3 3/4	14 1/2		8	9
	143T-145T													8 1/4	4 5/8	5	3 3/4	14 7/8	11 7/8	8	9
	182T-184T													6 7/16	5	8 3/4	4 15/16	19		11 3/4	12
PB-14A	56	1 1/4	6	4 1/4	8 1/16	1	8 13/16	10 3/8	12 3/16	10 1/4	1	7	6	9 15/16	5 1/2	8 3/4	4 15/16	20	15 3/16	11 3/4	12
	143T-145T																				
	182T-213T																				
PB-15A	143T-145T	1 1/4	7 1/4	4 7/8	7 7/8	1	9 13/16	11 3/8	13	10 13/16	1	8	8	9 15/16	6 1/8	8 3/4	4 15/16	21 1/4	15 3/16	11 3/4	12
	182T-184T																				
	213T-215T																				
	254T-256T													8 15/16		13		25 1/2		16	16 1/2
PB-18	143T-145T	1 1/4	6 1/4	4 3/8	10 1/2	15/16	10 1/2	12 11/16	14 1/2	12 7/16	1	8	6	9 15/16	5 5/8	8 3/4	4 15/16	20 1/4	15 3/16	11 3/4	12
	182T-184T																				
	213T-215T																				
	254T-256T													8 15/16		13		24 1/2		16	16 1/2
PB-18WA	182T-184T	1 1/4	8 1/16	5 5/16	9 7/8	7/8	11	13 3/16	15 1/8	11 15/16	1	10	6	12 3/4	6 1/2	10 3/4	6 1/4	24 1/16	18	13 3/4	16 1/2
	213T-215T													11 3/4							
	254T-256T															15 3/4		29 1/16		18 3/4	
	284T-286T													11							

OPTIONAL INLET SIZES

- ☐ 6" INLET AVAILABLE FOR PB-14A, PB-15A & PB-18
- ☐ 7" INLET AVAILABLE FOR PB-15A
- ☐ 8" INLET AVAILABLE FOR PB-14A & PB-18WA
- ☐ 10" INLET AVAILABLE FOR PB-15A & PB-18

NOTES:
1. HOUSINGS ARE ROTATABLE IN 45° INCREMENTS.
2. ALL MODELS: DISCHARGE FLANGE NOT AVAILABLE FOR DOWN BLAST DISCHARGE.

cincinnati fan
7697 SNIDER ROAD MASON, OHIO 45040

TOLERANCES: ANGLES: ± 1° FRACTIONS ±1/8 ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED

SUPERSEDES:

CERTIFIED DRAWING

TITLE: PB BLOWERS – ARR. 4

A | DRAWING NO. PB4 | REV. 1

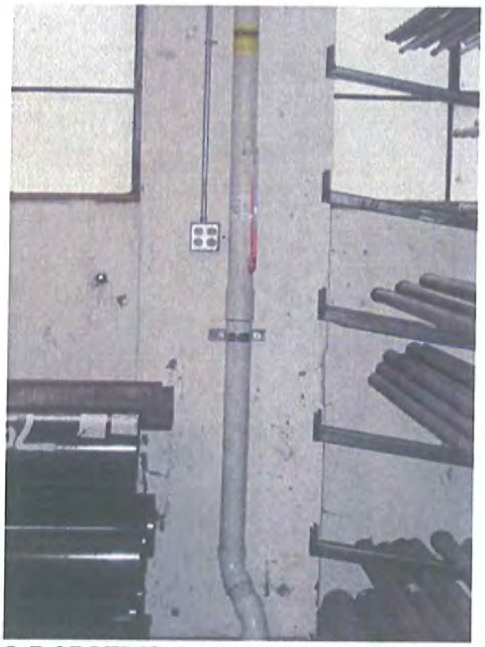
Appendix B

Photograph Log

6-7-07 VIMS-1 Puget Sound Pipe (Facing North) – Capped Riser after excavation of sump

6-4-07 VIMS-1 Puget Sound Pipe Warehouse (Facing North) – Shows polyeurothane sealing and installation vent piping from vacuum blower.

6-4-07 VIMS-1 Puget Sound Pipe Warehouse– Shows Digital Micromanometer recording the negative pressure differential over a test hole



8-7-07 VIMS-1 -Puget Sound Pipe (Facing North) - shows manometer and signs attached indicating contacts regarding the system

6-6-07 VIMS-3 Hudson Bay Warehouse (Facing West) - Drill set up to core out concrete

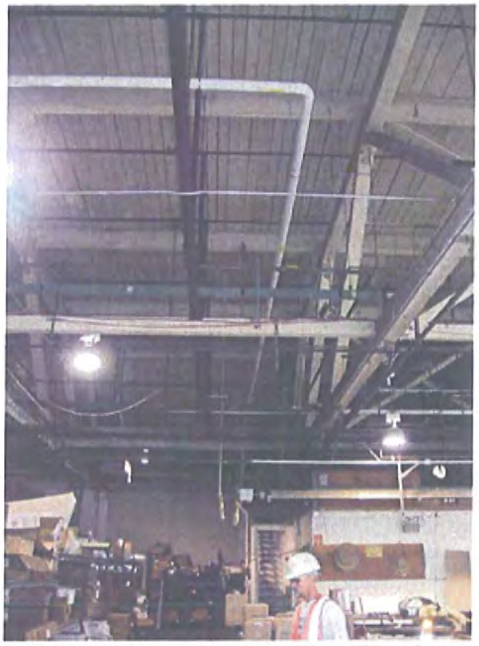
6-6-07 VIMS-3 Hudson Bay Warehouse (Facing North) – ART contractor drilling TH-8

6-6-07 VIMS-3 Hudson Bay Warehouse (Facing West) – Capped Riser after excavation of sump

8-2-07 VIMS-3 Hudson Bay Warehouse (Facing West) - Piping from exhaust fan to VIMS-3

6-7-07 VIMS-4 Hudson Bay Warehouse (Facing North) – Capped Riser after excavation of sump

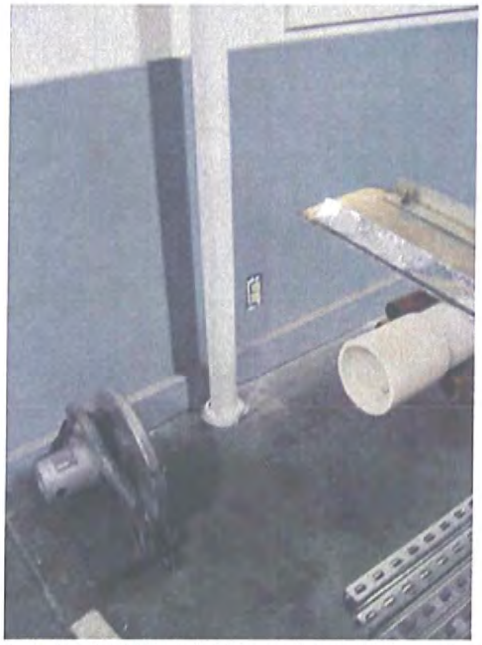
8-6-07 VIMS-4 Hudson Bay Warehouse (Facing West and up) – Piping connecting VIMS-3 and VIMS-4



8-6-07 VIMS-4 Hudson Bay Warehouse (Facing North) – Piping network from exhaust fan to VIMS-5B

8-6-07 VIMS-4 Hudson Bay Warehouse (Facing Northwest) – Manometer installed

6-4-07 VIMS-5A Puget Sound Pipe (Facing South East) - Drilled concrete sump

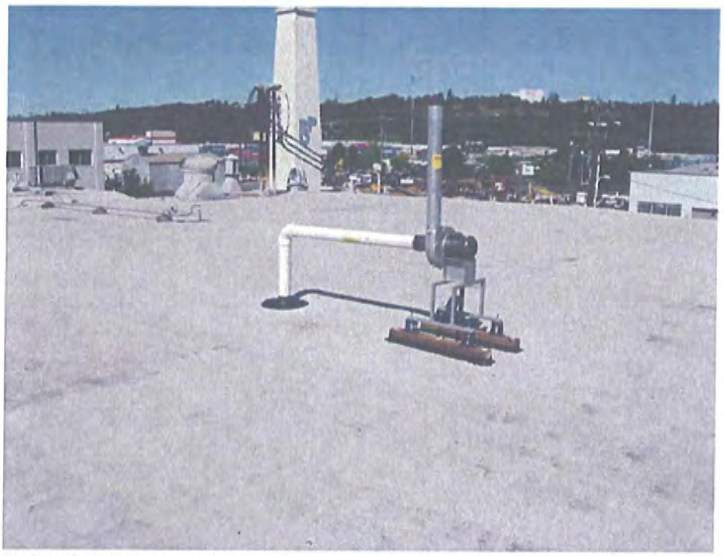


8-3-07 VIMS-5A Puget Sound Pipe (Facing South-East) – VIMS-5A Piping connecting to sump location

8-3-07 VIMS-5A Puget Sound Pipe (Facing South and Up) – Piping coming through Hudson Bay internal wall to Puget Sound Pipe.

6-7-07 VIMS-5B Hudson Bay Warehouse (Facing Northeast) – Capped Riser after excavation of sump

8-6-07 VIMS-5B Hudson Bay Warehouse (Facing North East) – Piping installed to the sump at VIMS-5B.



7-31-07 Exhaust fan unit - Mounted on roof of Hudson Bay Warehouse (Facing North-East)

7-31-07 Exhaust fan unit - Mounted on roof of Hudson Bay Warehouse (Facing North-West)

7-31-07 Exhaust fan unit - Mounted on roof of Hudson Bay Warehouse (Facing North)

8-2-07 Hudson Bay Warehouse (Facing South) -Electrical box for exhaust fan

8-6-07 Exhaust Fan– Sign placed on PVC exhaust pipe

Appendix C

Mechanical Permit Details

Permit Number:
6149569

CITY OF SEATTLE
Mechanical Permit

Department of Planning
and Development
700 Fifth Ave., Suite 2000
P.O. Box 34019
Seattle, WA 98124-4019
(206) 684-8600

DISTRICT 3

APN #:

Site Address: 220 S DAWSON ST, SEATTLE, WA
Building ID:
Location:
Legal Description:
Records Filed At:

OWNER	CONTRACTOR
MCKINSTRY 5005 3RD AVE SOUTH SEATTLE, WA 98134 Ph: (206) 762-3311	

Application Date:	08/08/2007
Issue Date:	09/20/2007
Expiration Date:	03/20/2009
Fees Paid:	$715.00
As of Print Date:	09/20/2007

Description of Work: Instalization of subslab depressuization system per plan

Permit Remarks: Contractor not selected at time of permit issuance. EEC

DPD Valuation: $14,500.00 **Special Inspections:** N

Land Use Conditions: N

Zoning/Overlays:

Residential Furnace/Appliance Information:

QTY.	Appliance Type	Fuel Type	Action Type	Manufacturer	Model #	Output

A/P #	Related Cases/Permits
None	

Project Contacts	Name	Phone
Structural Reviewer	DOMINIC MARICICH	(206) 233-7175
Zoning Reviewer	JENNIFER HENRY	(206) 684-5223
Mechanical Reviewer	ROBERT POMADA	(206) 684-8440
Primary Applicant	DANIEL ARCIERI	(206) 624-2839

Applicant Signature: Daniel Arcieri **Date:** 9-20-07

Permitted work must not progress without prior inspection approval. When ready for inspection, make request with the Department of Planning and Development at (206) 684-8900 or on the internet at: www.seattle.gov/dpd/inspectionrequest. Provide the permit number, site address, and contact phone. Permission is given to do the above work at the site address shown, according to the conditions hereon and according to the specification pertaining thereto, subject to compliance with the Ordinances of the City of Seattle. Correct information is the responsibility of the applicant. Permits with incorrect information may be subject to additional fees.

THIS PERMIT MUST BE CONSPICUOUSLY POSTED AT THE WORK SITE

PERMIT # 6149569

City of Seattle
Department of Planning and Development
700 Fifth Ave., Suite 200

POST THIS SIDE OUT: THIS PERMIT MUST BE CONSPICUOUSLY POSTED AT THE WORK SITE

TO THE CONTRACTOR/OWNER,

Additional permits may be required for work occurring under this permit. This permit does not authorize Sewer, Public Right-of-Way Shoring, Drainage and Street Use, Fire Department, Boiler, Electrical, Elevator, Furnace, Gas Piping, Plumbing, or Sign permits. If other permits are required, they must be applied for separately from this permit. The requirements for all other permits related to this Permit, must be completed prior to the Final Inspection of this permit.

This Permits Final Inspection is required. The premises must not be occupied until the Final Inspection is provided and occupancy is authorized by the Seattle Department of Planning and Development.

ISSUED PERMIT STATUS:

You can check the status of issued permits on the internet at: www.seattle.gov/dpd

INSPECTION REQUESTS:

Please clarify which inspections your project requires before proceeding with your project.

You may request an inspection on the internet or by phone. Inspection requests received **before 7:00 AM** are scheduled for the same working day. Inspection requests received **after 7:00 AM** are scheduled for the next working day. Inspectors are available between the hours of 7:30 AM and 8:30 AM.

A) **Internet at:** www.seattle.gov/dpd/inspectionrequest Under ***Quick Links***, click ***Request an Inspection.***
B) **24 hour inspection request line at (206) 684-8900**, cell phones are discouraged due to frequent connection problems.
C) **Customer Service at (206) 684-8950** between the hours of 7:30 AM and 4:30 PM.

FIRST GROUND DISTURBANCE:

A) Before First Ground Disturbance, request an inspection of installed **Erosion Control Measures**.
B) When required, request a **Pre Construction Conference** to review project conditions and Special Inspections by calling (206) 684-8860.
C) If this permit requires a **Soil Bearing Capacity** special inspection by a Geotechnical Engineer, that approval is required **before** the foundation pour. The Building Inspector will accept the Geotechnical Engineer's approval signature below.
D) When **Special Inspections** are required, notify the Special Inspection Agency at least 24 hours in advance.

City of Seattle
Department of Planning and Development

BUILDING PERMIT FIELD INSPECTION REPORT

PERMIT # 6149569 ADDRESS 220 S Dawson St

BLDG ID # 450-0444

INSPECTION TYPE

☐ PRE CONSTRUCTION CONFERENCE	☐ FRAMING
☐ TEMPORARY EROSION AND SEDIMENT CONTROL	☐ SUB FLOOR ☐ WALLS ☐ CEILING GRID
☐ ADVISORY ONLY	☐ FIRE RESISTANCE – RATED ASSEMBLY
	☐ INSULATION
☐ SET BACK / LOCATION	☐ SLAB ☐ WALLS ☐ CEILING
☐ FOUNDATION	☐ FINAL
☐ FOOTINGS ☐ WALLS	
☐ STRUCTURAL	☐ SFD/DUPLEX FURNACE FINAL
☐ SHEAR WALLS – EXT. ☐ SHEAR WALLS – INT.	☐ MECHANICAL COVER
☐ HD'S / STRAPS ☐ DIAPHRAGM	☒ MECHANICAL FINAL

INSPECTION RESULT

☒ PASSED ☐ PARTIAL PASSED ☐ FAILED ☐ WAIVED

☐ Corrections Required ☐ Corrections Completed ☐ Permit Cancelled; Inspection Refund Approved

COMMENTS (FOR THE RECORD):

Ok Final

☐ **REINSPECTION FEE APPLIES:**

☐ APPROVED PLANS NOT ON SITE ☐ NOT READY FOR INSPECTION ☐ NO ONE ON JOBSITE ☐ CORRECTIONS INCOMPLETE

REQUIRED APPROVAL	DATE APPROVED	REQUIRED APPROVAL	DATE APPROVED
☐ SPECIAL INSPECTIONS		☐ BOILER	
☐ ELECTRICAL		☐ CONVEYANCE	
☐ PLUMBING		☐ REFRIGERATION	
☐ GAS PIPING		☐ SITE/SIDE SEWER	
☐ MECHANICAL		☐ SHOP DRAWINGS ON SITE	
☐ SDOT - STREET USE		☐ LANDSCAPING	
☐ SDOT - PRIVATE CONTRACT		☐ LAND USE CONDITIONS	
☐ SFD		☐ COUNCIL ORDINANCE	
☐ OTHER -		☐ OTHER -	

☐ OCCUPANCY APPROVED (NO CERTIFICATE REQUIRED). ☐ PTS PERMIT DO NOT CLEAR

☐ TEMPORARY OCCUPANCY APPROVED, TCO DURATION IN DAYS: _____.

TCO LIMITS: _____.

☐ OK TO ISSUE CERTIFICATE OF OCCUPANCY.

INSPECTOR: [signature] **DATE:** 10/4/07 **PHONE:**

WHITE COPY - ORIGINAL YELLOW COPY - FIELD PINK COPY - Inspector

REVISED 7/26/2006

Appendix D

Manufacturer Specifications and O&M Forms

cincinnati fan

Form: OMM-01-0207
Effective: 2/12/07
Part No.: 01218

Installation, Safety, Operation & Maintenance Instructions And Parts List
For Models PB, PBS, SPB, LM and LMF.
Arrangement 4 Blowers

BLOWER SPECIFICATIONS

BLOWER SERIAL NUMBER: 708393 **MFG. DATE:** 06/29/07

NOTE: The serial number above is a required reference for any assistance. It is stamped on the blower nameplate.

BLOWER SPECIFICATIONS:

Model: PB-9 **Arrangement:** 4 **Rotation:** CW **Discharge:** UB

Nominal Inlet Size: 5 (in Inches) **Wheel Size and Type:** 10-1/4 X 3 BC

BLOWER PERFORMANCE DATA: (If entered on order)

CFM: 125 **SP:** 6.5 (Inches of Water Gauge) **Motor BHP:** 0.265

Density: 0.075 **Altitude:** _____ (Ft. above S.L.) **Airstream Temperature:** 70 °F.

Fan RPM: 3450 **Maximum Safe Fan RPM:** _____ **DO NOT EXCEED THIS RPM**

MOTOR DATA: (This section is completed only if the motor was supplied by Cincinnati Fan)

HP: 1/3 **RPM:** 3450 **Voltage:** 115/208-230V **Phase:** 1

Hz: 60 **Frame Size:** 56C **Enclosure:** TEFC **Efficiency:** Std Eff

IF Motor is EXP, Class(es) & Group(s) are: _____

Manufacturers Model Number: .3336ES1BB56C **CFV Part Number:** 37107W

ATTENTION: RECEIVING DEPARTMENT

All Cincinnati Fan products are packaged to minimize any damage during shipment. The freight carrier is responsible for delivering all items in their original condition as received from Cincinnati Fan. The individual receiving this equipment is responsible for inspecting this unit for any obvious or concealed damage. If any damage is found, it should be noted on the bill of lading before the freight is accepted and the receiver must file a claim with the freight carrier.

LONG TERM STORAGE NOTICE

If this blower will NOT be installed and put into operation within 30 days, refer to the "Long Term Storage Instructions" on pages 12 and 13. Failure to follow all applicable long term storage instructions, will void your warranty. This blower should be stored in doors in a clean, dry location. If it must be stored outside, refer to the "Long Term Storage Instructions".

⚠ DANGER

				
Hazardous voltage can cause electrical shock and death.	High speed rotating equipment can cause severe personal injury.	Lock out/Tag out to prevent personal injury BEFORE starting ANY service or inspection.	Avoid injury. NEVER operate without ALL required safety guards in place.	Avoid injury. You MUST read and understand all instructions in this manual BEFORE installing.

TABLE OF CONTENTS

I. GENERAL

A. Unpacking:

Be careful not to damage or deform any parts of the blower when removing it from the packaging container. **All the packaging material should be kept in the event the blower needs to be returned.**

Handling:

Handling of the blower should be performed by trained personnel and be consistent with all safe handling practices. Verify that all lifting equipment is in good operating condition and has the proper lifting capacity. The blower should be lifted using well-padded chains, cables or lifting straps with spreader bars. Some blower models have lifting eye locations provided in the blower base. NEVER **lift the blower by an inlet or discharge flange, motor shaft, motor eye bolt, or any other part of the blower assembly that could cause distortion of the blower assembly.**

B. Safety Instructions & Accessories:

1. **Safety Instructions:**
   All installers, operators and maintenance personnel should read AMCA Publication 410-96, **"Recommended Safety Practices for Users and Installers of Industrial and Commercial Fans".** This manual is included with the blower. Additional copies can be requested by writing us at Cincinnati Fan, 7697 Snider Rd., Mason, OH 45040-9135
2. **Sound:**
   Some blowers can generate sound that could be hazardous to personnel. It is the responsibility of the user to measure the sound levels of the blower and/or system, determine the degree of personnel exposure, and comply with all applicable safety laws and requirements to protect personnel from excessive noise.

3. **Air Pressure and Suction:**
In addition to the normal dangers of rotating machinery, the blower can present additional hazards from the suction or pressure created at the blower inlet or discharge. Suction at the blower inlet can draw materials into the blower where they become high velocity projectiles at the discharge and cause severe personal injury or death. It can also be extremely dangerous to persons in close proximity to the inlet or discharge as the forces involved can overcome the strength of most individuals.

⚠ WARNING

NEVER OPERATE A BLOWER WITH A NON-DUCTED INLET AND/OR DISCHARGE. IF THE BLOWER INLET AND/OR DISCHARGE IS NON-DUCTED, IT IS THE USERS RESPONSIBILITY TO INSTALL AN INLET AND/OR DISCHARGE GUARD.

4. **Temperature:**
Many blowers, blower components and all motors operate at temperatures that could burn someone if they come in contact with them. If this potential hazard could exist in your installation, steps must be taken by the user to protect anyone from coming in contact with this equipment.

5. **Spark Resistance;** (Per AMCA Standard 99-0401-86 and ISO 13499)

⚠ DANGER

NO GUARANTEE OF ANY LEVEL OF SPARK RESISTANCE IS IMPLIED BY SPARK RESISTANT CONSTRUCTION. IT HAS BEEN DEMONSTRATED THAT ALUMINUM IMPELLERS RUBBING ON RUSTY STEEL CAN CAUSE HIGH INTENSITY SPARKS. AIR STREAM MATERIAL AND DEBRIS OR OTHER SYSTEM FACTORS CAN ALSO CAUSE SPARKS.

6. **Safety Accessories;**
Guards:
All moving parts must be guarded to protect personnel. Safety requirements can vary, so the number and types of guards required to meet company, local, state and OSHA regulations must be determined and specified by the actual user or operator of the equipment.

NEVER start any blower without having all required safety guards properly installed. All blowers should be checked on a regular schedule, for missing or damaged guards. If any required guards are found to be missing or defective, the power to the blower should be immediately turned off and locked out in accordance with OSHA regulations. Power to the blower should NOT be tuned back on until the required guards have been repaired or replaced.

This blower can become dangerous due to a potential "windmill" effect, even though all electrical power has been turned off or disconnected. The blower wheel should be **carefully** secured to prevent any rotational turning ***BEFORE*** working on any parts of the blower/motor assembly that could move.

7. **Access or Inspection Doors:**

⚠ DANGER

NEVER OPEN ANY ACCESS OR INSPECTION DOORS WHILE THE BLOWER IS OPERATING. SERIOUS INJURY OR DEATH COULD RESULT FROM THE AFFECTS OF AIR PRESSURE, AIR SUCTION OR MATERIAL THAT IS BEING CONVEYED. DISCONNECT OR LOCK OUT POWER TO THE BLOWER AND LET THE BLOWER WHEEL COME TO A COMPLETE STOP *BEFORE* OPENING ANY TYPE OF ACCESS OR INSPECTION DOOR.

II. INSTALLATION

A. Vibration:

Before any mounting method is selected, the user should be aware of the effects vibration will have on the blower, motor and other parts. Improper blower installation can cause excessive vibration causing premature wheel and/or motor bearing failure, that is not covered under warranty. Vibration eliminator pads, springs or bases should be properly installed to prevent any blower vibration from transmitting to the foundation, support structure or ducting.

⚠ WARNING

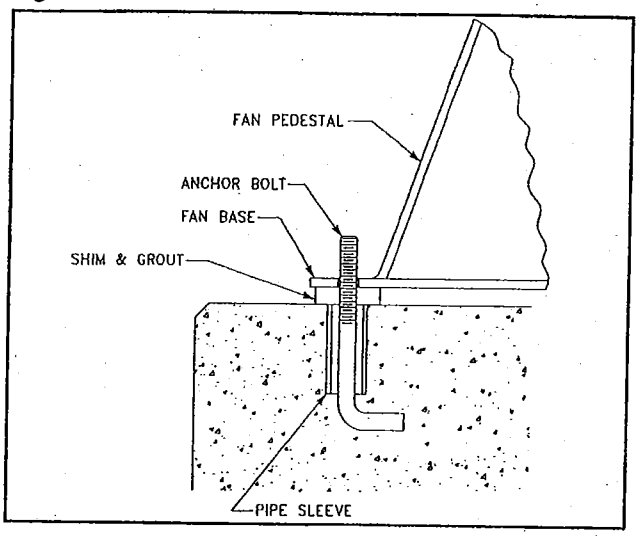
SHUT THE BLOWER DOWN IMMEDIATELY IF THERE IS ANY SUDDEN INCREASE IN VIBRATION.

B. Mounting Methods:

1. **Floor Mounted Units;**

Centrifugal blowers should be mounted on a flat, level, concrete foundation weighing 2-3 times the weight of the complete blower/motor assembly. It is recommended that the foundation be at least 6 inches larger than the base of the blower. The foundation should include anchor bolts such as shown in **Fig. 1** on page 4. Place the blower over the anchor bolts and shim under each bolt until the blower is level. After shimming, flat washers, lock washers and lock nuts should be tightened at each anchor bolt. Any gaps between the blower base and the foundation should be grouted. If the blower will be sitting on some type of vibration pads or mounts, follow the recommended mounting procedures supplied with the vibration elimination equipment.

Fig. 1



2. **Elevated Units;**

Improper mounting of elevated blowers can cause vibration problems. The structure that the blower/motor assembly will be mounted on must be strong enough to support at least 3 times the weight of the entire blower/motor assembly. **An insufficient support will cause excessive vibration and lead to premature wheel and/or motor bearing failure.** Bracing of the support structure must be sufficient enough to prevent any side sway. The entire structure should be welded at all connection joints to maintain constant alignment of the platform.

⚠ DANGER

THE IMPROPER DESIGN OF AN ELEVATED PLATFORM STRUCTURE COULD RESULT IN A RESONANT CONDITION, AND CONSEQUENTLY, CAUSE A LIFE THREATENING, CATASTROPHIC, STRUCTURAL FAILURE.

C. Duct Work Connections:

All duct connections to the blower should include flexible connectors between the ducting and the blower inlet and/or discharge. This will eliminate distortion, noise and vibration from transmitting to the duct and building. The connectors should be selected to handle the operating conditions for air volume and pressure that the blower will produce. **All ducting or accessories, added by the user, should be independently supported. DO NOT use the blower/motor assembly to support any additional weight.** Inlet and/or discharge duct elbows should be located a minimum of 2 blower wheel diameters from the blower. Any duct elbows located closer than 2 wheel diameters to the blower inlet or discharge **WILL** reduce the air performance and blower efficiency. Any duct elbows near the blower discharge should be in the **same rotational direction** as the **blower rotation.**

Non-Ducted Blower Inlet:

Any blower with no ducting on the inlet **must** have an inlet guard. The blower should be located so the blower inlet is, at least, 1 wheel diameter away from any wall or bulkhead to eliminate a reduction in air flow.

Non-Ducted Blower Discharge:

Any blower with no ducting on the discharge **must** have a discharge guard.

D. Safety Guards:

Cincinnati Fan offers guards, as optional, to keep your blower in compliance with OSHA safety regulations. These include inlet or discharge guards. Any blowers built with high temperature construction, a "heat slinger guard" is standard. It is the responsibility of the user to make sure this blower meets all local, state and OSHA safety regulations. If you have a specific guard requirement not covered by OSHA, please contact the local Cincinnati Fan sales office for assistance.

E. Dampers and Valves: (Airflow control devices)

If the blower is supplied with any type of air flow control device, it should be closed before initial start-up of the blower to minimize overloading of the motor. Any airflow control device, with bearings, should be maintained in accordance with the manufacturers instructions. Any air flow control device, with an automatic control mechanism, should be adjusted per the manufacturers recommendations.

F. Set Screw and Taper-lock Bushing Torque Values:

All blower wheel set screws are tightened to the proper torque prior to shipment. Some wheels may have taper-lock hubs and split, taper-lock bushings to secure the wheel to the motor shaft.

NOTE: Check all set screw or taper-lock bushing torques. Forces encountered during shipment, handling, rigging and temperature can affect factory settings. For correct torque values, see **Tables 1** and **2** below.

Table 1

SET SCREW TORQUE VALUES		
Diameter & Number of Treads/Inch	Hex Wrence Size (Across Flats)	Required Torque (Inch Pounds)
1/4-20	1/8"	65
5/16-18	5/32"	165
3/8-16	3/16"	228
7/16-14	7/32"	348
1/2-13	1/4"	504
5/8-11	5/16"	1104

Table 2

TORQUE VALUES FOR TAPER-LOCK BUSHINGS	
Taper-lock Bushing Size	Required Torque (Inch Pounds)
H	95
B	192
P	192
Q	350
R	350

⚠ CAUTION

Set screws should NEVER be used more than once. If the set screws are loosened, they MUST be replaced. Use only knurled, cup-point, set screws with a nylon locking patch.

III. ELECTRICAL

A. Disconnect Switches:

All blower motors should have an independent disconnect switch located in close visual proximity to turn off the electrical service to the blower motor. **Disconnects must be locked out in accordance with OSHA "lock out-tag out" procedures any time inspection or maintenance is being performed on the blower and/or motor assembly. The "lock out-tag out" procedure should be performed by a licensed electrician or authorized personnel.** All disconnects should be sized in accordance with the latest NEC codes (National Electric Codes) and any local codes and should be installed only by a licensed electrician. "Slow blow" or "time delay" fuses or breakers should be used since the initial start-up time for the blower motor, although rare, can be up to 10 seconds.

B. Motors:

⚠ DANGER

ALL WIRING CONNECTIONS, INSPECTION AND MAINTENANCE OF ANY MOTOR MUST BE PERFORMED BY A LICENSED ELECTRICIAN IN ACCORDANCE WITH THE MOTOR MANUFACTURERS RECOMMENDATIONS, ALL ELECTRICAL CODES AND OSHA REGULATIONS. FAILURE TO PROPERLY INSTALL, MAKE WIRING CONNECTIONS, INSPECT OR PERFORM ANY MAINTENANCE TO A MOTOR CAN RESULT IN MOTOR FAILURE, PROPERTY DAMAGE, EXPLOSION, ELECTRICAL SHOCK AND DEATH.

1. **DO NOT connect or operate a motor without reading the motor manufacturers instructions supplied with the blower.** The basic principle of motor maintenance is: **KEEP THE MOTOR CLEAN AND DRY.** This requires periodic inspections of the motor. The frequency of the inspections depends on the type of motor, the service and environment it will be subjected to and the motor manufacturers instructions.
2. **Cleaning:** Cleaning should be limited to exterior surfaces only. **Follow motor manufacturers cleaning instructions.**
3. **Lubrication:** Most small motors have sealed bearings that are permanently lubricated for the life of the motor. Some larger motors have grease plugs that should be replaced with grease fittings to perform re-lubrication. These motors, or any motor with grease fittings, should be lubricated in accordance with the motor manufacturers recommendations. Lubrication frequency depends on the motor horsepower, speed and service. **BE SURE** you use compatible grease and **DO NOT** over grease.
4. **Location:** If the motor will be outside and subjected to the weather, it is recommended that a weather cover be installed to keep rain and snow off of the motor. No motors are guaranteed to be "watertight". Be careful to allow enough openings between the motor and the motor cover to let the motor "breath". If the back end of the motor is covered, the cover should be no closer than 3" to the back of the motor for proper ventilation.

5. **Wiring Connections:** All wiring connections should be made for the proper voltage and phase as shown on the motor nameplate. Connections should follow the motor manufacturers recommendations as shown on the wiring schematic. This wiring diagram will be located on the outside of the motor, inside of the motor conduit box or on the motor nameplate. **Reversing some wires might be necessary to get the correct blower rotation.**
6. **Motors with Thermal Overload Protection:** If a motor is equipped with thermal overloads, the thermal overload must be wired per the wiring schematic to be operable. ***There are 3 types of thermal overloads:***
   a. **Automatic:** These will automatically shut the motor down if the internal temperature exceeds the design limits.

⚠ DANGER

MAKE SURE YOU LOCK OUT THE POWER TO THE MOTOR BEFORE INSPECTING ANY MOTOR WITH AUTOMATIC THERMALS. WHEN THE THERMALS COOL DOWN, THEY WILL ALLOW THE MOTOR TO AUTOMATICALLY START UP AGAIN, UNLESS YOU HAVE LOCKED OUT THE POWER TO THE MOTOR.

   b. **Manual:** These motors will have a button on them. If the motor overheats, it will shut down. After you have inspected the motor and eliminated the over heating problem, you will need to "reset" it by pushing the button. **You should still lock out the power BEFORE inspecting the motor.**
   c. **Thermostats:** This type of thermal is a temperature sensing device **ONLY**. If the motor overheats, the thermostats will open or close (depending on the type) and send a **"signal"** to the electrical box. ***THEY WILL NOT TURN THE MOTOR OFF.*** **These are pilot circuit devices that must be connected to the magnetic starter circuit.**

7. **EXPLOSION PROOF Motors:** No motor is explosion proof. Explosion proof (EXP) motors are designed so if there is an explosion **WITHIN** the motor, the explosion will be **CONTAINED INSIDE** the motor and not allowed to get out to the atmosphere. All explosion proof motors must be selected based on the atmosphere and/or the environment the motor will be operating in. Explosion proof motors are designed, rated, and labeled for their operating conditions based on Classes, Groups and "T" Codes. **The Class, Group and "T" Code of an EXP motor MUST be selected based on the atmosphere and/or environmental conditions the motor will be operating in. Consult the NEC (National Electric Code) and the NFPA (National Fire Protection Association) for the proper EXP motor Class, Group and "T" Code required for your specific application and location.**

⚠ DANGER

IF AN EXPLOSION PROOF MOTOR IS USED IN AN AREA CONTAINING VOLITILE LIQUIDS, GASES, FUMES OR DUST FOR WHICH THE MOTOR WAS NOT DESIGNED TO OPERATE IN, AN EXPLOSION AND/OR FIRE CAN OCCUR.

NOTICE:

   a. **All EXP motors have some type of thermal overload as required by UL (Underwriters Laboratories). Refer to all of Section 6 above.**
   b. **All EXP motors are required to have the UL (Underwriters Laboratories) and CSA (Canadian Standards Association) listing numbers on the motor name plate or on a separate plate attached to the motor. The Class, Group and "T" Code the motor is designed for must also be listed.**

8. **Normal Motor Operating Temperatures:**
   Using your hand to test the normal running temperature of a motor can be a very painful experience;
   The normal operating temperature of a fully loaded, open type, electric motor operating in a 70°F. (21° C.) ambient temperature is 174°F. (79° C.)

C. Maximum Blower Speed and Motor Speed Controllers:

If you will be using any type of motor speed controller with this blower, **DO NOT** exceed the **maximum safe blower speed.** Installing and using a speed control devise requires special training and certification as required by the speed control manufacturer. See the manufacturers instructions for proper use, installation and wiring connections for the maximum speed settings. It may also be necessary to "block out" some speeds to eliminate a resonant vibration problem. The maximum safe blower speed is shown on the data sheet shipped with the blower. If you have lost the data sheet, contact Cincinnati Fan or our sales office for your area. You must have the serial number from the **blower** name plate for us to determine the maximum safe blower speed. Cincinnati Fan will only extend the motor manufacturers warranty, when used with a speed controlling devise, if the motor has the words **"Inverter Duty"** marked on the motor name plate. If the motor does not have **"Inverter Duty"** marked on the motor name plate, and you have a motor failure, you will be required to contact the motor manufacturer for any service or warranty claims.

IV. INITIAL UNIT STARTUP

NOTICE: Failure to complete and document all the following pre-startup and both post-startup checks, listed in sections A (below) and B on page 8, could void all warranties.

A. Pre-Startup & Post-Startup Checks: (Check blocks as each step is completed. Retain this for your records.)

A1. Pre-Startup Checks Completed By: _____ **DATE:** _____

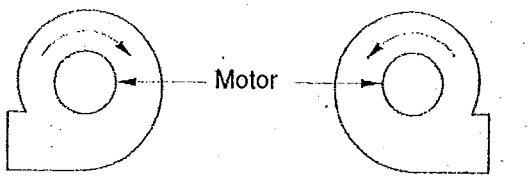
A2. 8 Hour, Post-Startup Checks Completed By: _____ **DATE:** _____

A3. 3 Day, Post-Startup Checks Completed By: _____ **DATE:** _____

MAKE SURE POWER TO THE MOTOR IS LOCKED OUT BEFORE STARTING PRE-STARTUP OR POST-STARTUP CHECKS.

1. ☐☐☐ If possible, *CAREFULLY* spin the blower wheel by hand to ensure it rotates freely and no rubbing or clicking noise is heard.
2. ☐☐☐ Check all blower, foundation and duct work hardware to make sure it is tight.
3. ☐☐☐ Check all blower wheel set screws to make sure they are tight per **Table 1** on page 5.
4. ☐☐☐ If the wheel has a taper-lock bushing, make sure the bolts are tightened per **Table 2** on page 5.
5. ☐☐☐ Make certain there is no foreign material in the blower or duct work that can become a projectile.
6. ☐☐☐ Make sure any inspection doors in the duct work are securely bolted or locked.
7. ☐☐☐ Ensure all electrical power components are properly sized and matched for your electrical system.
8. ☐☐☐ Check that all required guards are properly secured.
9. ☐☐☐ Any dampers should be fully opened and closed to make sure there is no binding or interference.
10. ☐☐☐ If your blower is mounted on an elevated support structure, make sure the structure is welded at all the joint connections and the structure is properly braced to prevent "side sway".
11. ☐☐☐ Close any dampers to minimize load on motor. Especially on blowers with high temperature construction. **Never** subject a "cold" blower to a "hot" gas stream. If the blower will be handling "hot gases" greater than 150°F (65°C) it is imperative that the blower be subjected to a gradual rate of temperature increase, not to exceed 15°F/minute (8°C/minute). The same temperature limits are also important when the blower is experiencing a drop in temperature until the temperature drops down to 150°F (65°C). Only, when the <u>entire</u> blower has reached an equilibrium temperature of 150°F (65°C), or less, should the power be turned off.
12. ☐☐☐ Make sure the power source connections to the blower motor are per the motor manufacturers instructions.
13. ☐☐☐ Make sure the blower wheel is stationary prior to startup. **Starting a blower with a wheel that is rotating backwards can cause wheel damage.**
14. ☐☐☐ Apply power to the blower motor momentarily (i.e. "bump start") to check for proper blower wheel rotation. If the blower is rotating in the wrong direction, reconnect the motor leads per the motor manufacturers wiring schematic. **Blower rotation is determined by viewing the blower from the <u>motor side</u> of the blower, NOT from the inlet side.** After reconnecting the leads, repeat this step. **See Fig. 2 below.**

Fig. 2



Clockwise (CW) Rotation **Counter-Clockwise (CCW) Rotation**

15. ☐☐☐ Apply power to the blower motor and let it come up to full speed. **Turn off the power.** Look and listen for any unusual noise or mechanical abnormality while the blower wheel is still spinning. If any are noticed, lock out the power, wait for the blower wheel to come to a complete stop, locate the cause and correct it.
16. ☐☐☐ Unlock power and start the blower.
17. ☐☐☐ Measure, record and keep the following motor data for future reference and comparison:
(Single phase motors will only have L1 and L2 leads)

Amperage draw on each motor lead: L1 _____ **L2** _____ **L3** _____
(<u>Running</u> amps **SHOULD NOT** exceed the motor nameplate amps for the voltage being operated on)

Voltage coming to motor leads: L1_____ **L2**_____ **L3**_____
(Should be <u>about</u> the same input voltage on <u>all</u> leads)

B. Vibration:

The blower was balanced at the factory to comply with ANSI/AMCA Standard 204-05, Category BV-2. However, rough handling in shipment and/or erection, weak and/or non-rigid foundations, and misalignment may cause a vibration problem after installation. After installation, the vibration levels should be checked by personnel experienced with vibration analysis and vibration analysis equipment.

NOTE:

The blower SHOULD NOT be operated if the vibration velocity of the fan exceeds 0.50 inches per second, filter out, if the blower is rigidly mounted. If the blower is mounted on isolators or on an isolator base, it SHOULD NOT be operated if the vibration velocity of the blower exceeds 0.75 inches per second, filter out.

Vibration readings for direct driven blowers should be taken on the motor at the top, sides and end as per **Fig. 3** below. After you have taken your vibration readings, write them down in the spaces below and keep for future comparison.

⚠ DANGER

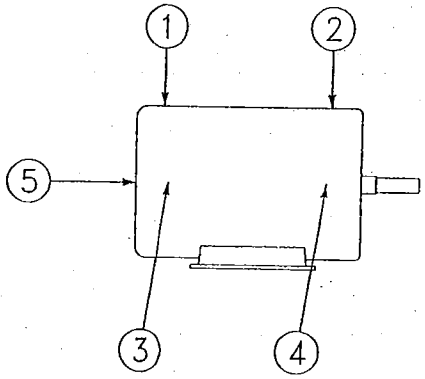
If the blower is going to be conveying material, it is the users responsibility to periodically turn the blower off and lock out the power. The blower wheel should then be checked for material build-up and/or erosion. If material has built up on any parts of the wheel, it MUST be removed and cleaned before it is put back into service. If any parts of the wheel have been eroded, the wheel MUST be replaced. Failure to perform this inspection can cause excessive vibration that will damage the blower and/or motor bearings. When vibration becomes excessive, it will lead to complete blower failure that could cause property damage, severe personal injury and death. The user must determine the frequency of this inspection based on the actual circumstances of their operation, BUT checking the vibration readings should NEVER exceed a 12 month period. For the AMCA/ANSI standard for vibration limits, see Fig. 4 on page 9.

Fig. 3

VIBRATION METER PROBE POSITIONS

For Arrangement 4 Blowers

	1	2	3	4	5
A					
B					
C					

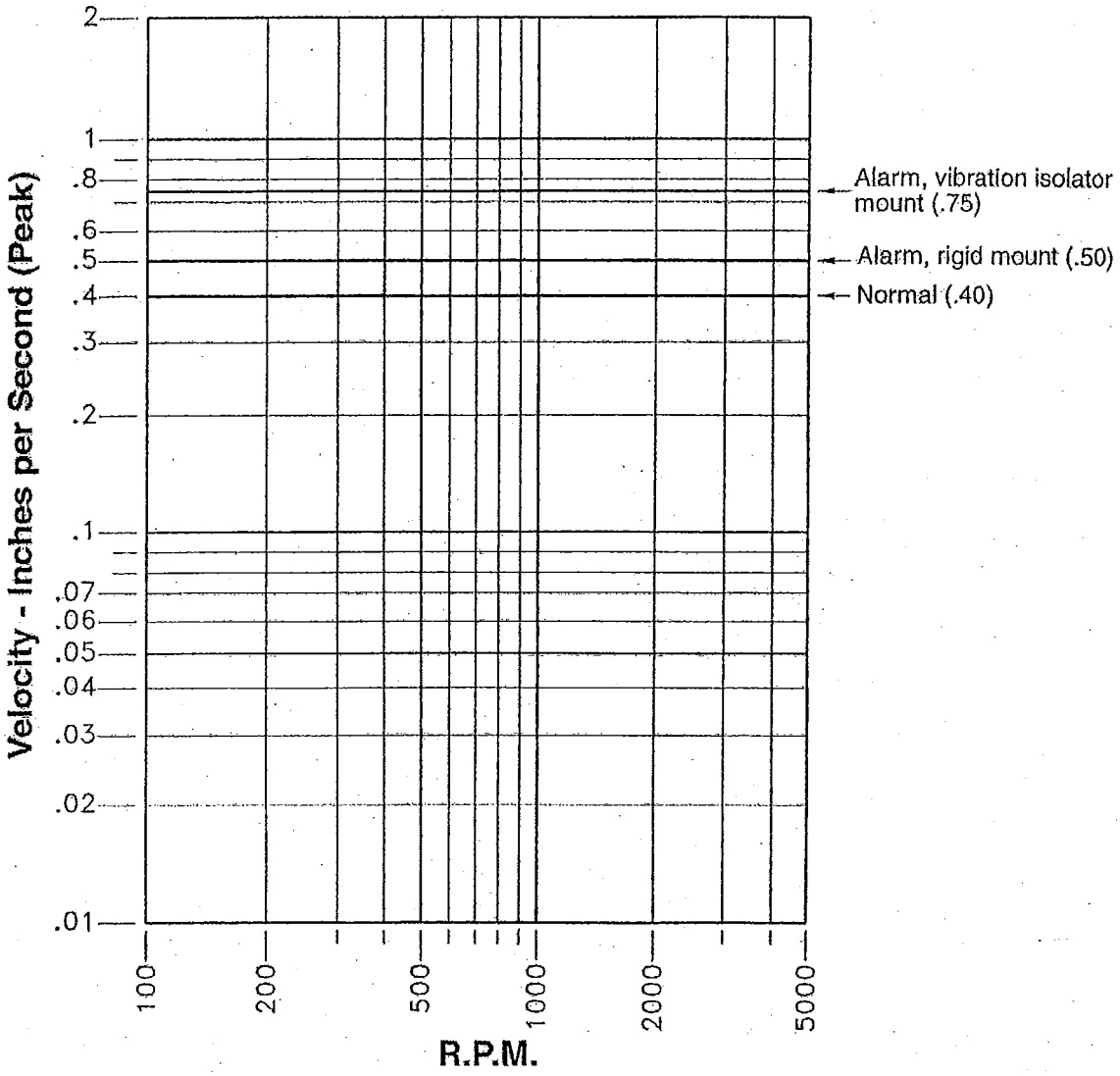


A Pre-Startup ..... Readings taken by: _____ **Date:** _____

B 8 Hour Post-Startup ..... Readings taken by: _____ **Date:** _____

C 3 Day Post-Startup ..... Readings taken by: _____ **Date:** _____

Fig. 4 Vibration Severity Chart



V. ROUTINE INSPECTION & MAINTENANCE

Periodic inspection of all the blower parts is the key to good maintenance and trouble-free operation. The frequency of inspections must be determined by the user and is dependent upon the severity of the application. **BUT**, it should **NEVER** exceed a 12 month period. The user should prepare an inspection and maintenance schedule and make sure it is adhered to.

⚠ WARNING

BEFORE STARTING ANY INSPECTION OR MAINTENANCE, BE SURE BLOWER IS TURNED OFF, POWER IS LOCKED OUT AND THE BLOWER WHEEL HAS BEEN CAREFULLY SECURED TO PREVENT WIND MILLING. IF THE OPERATING CONDITIONS OF THE BLOWER ARE TO BE CHANGED (SPEED, PRESSURE, TEMPERATURE, ETC.) CONSULT CINCINNATI FAN, OR OUR SALES OFFICE FOR YOUR TERRITORY, TO DETERMINE IF THE UNIT WILL OPERATE SAFELY AT THE NEW CONDITIONS.

A. Hardware:

All blower and foundation hardware should be checked to make sure it is tight. Wheel set screws or taper-lock bushings should be tightened to the torque values shown in **Tables 1 and 2** on page 5.

NOTE: If any set screws have come loose, they must be thrown away and replaced. NEVER use set screws more than once. **Replace with knurled, cup-point set screws with a nylon locking patch.**

B. Motor Bearing Lubrication:

1. Motor Bearings:

Most smaller motors have sealed bearings that never require re-lubrication for the life of the motor. For any motors with grease fittings, consult the motor manufacturers recommendations with reference to the lubrication frequency and the type of grease that should be used.

DO NOT over grease the motor bearings. Generally, 1-2 shots should be enough. Use a hand operated grease gun at no more than 40 PSI. ***IF POSSIBLE, CAREFULLY*** **lubricate the motor bearings while the motor is running.**

C. Wheel Balance:

All blower wheels are balanced at the factory. It is not uncommon that additional "trim balancing" is required after the blower is assembled. Trim balancing of the blower assembly, in the field, is typically always necessary for all replacement wheels. **After any wheel is installed, the final balance of the entire blower assembly should be checked.** Refer to Section B on page 8 and Fig. 4 on page 9. Air stream material or chemicals can cause abrasion or corrosion of the blower parts. This wear is generally uneven and, over time, will lead to the wheel becoming unbalanced, causing excessive vibration. When that happens, the wheel must be rebalanced or replaced. The other air stream components should also be inspected for wear or structural damage and cleaned or replaced if necessary. **After cleaning any blower wheel, it should be balanced and then "trim balanced" on the motor shaft.**

There are three ways to balance a blower wheel:

1. **Add balancing weights for fabricated aluminum, steel or stainless steel wheels:**
   Balance weights should be rigidly attached to the wheel at a location that will not interfere with the blower housing nor disrupt air flow. They should (if at all possible) be welded to the wheel. When trim balancing the wheel, **on the blower,** be sure to ground the welder **directly** to the blower wheel. Otherwise, the welding current will likely pass through the motor and damage the motor bearings.
2. **Grinding off material for cast aluminum wheels:**
   If you are grinding on the wheel to remove material, be very careful not to grind too much in one area. That could affect the structural integrity of the wheel.
3. **Forward curved wheels, Model LM only (also known as squirrel cage or multivane wheels).**
   These wheels have balancing clips attached to individual blades around the wheel. That is the only proper way to balance this type of wheel.
   NOTE:
   Removing any forward curve wheel from the blower to clean it, requires special attention when reinstalling the wheel back into the blower housing. Make sure you reinstall the wheel so the proper wheel-to-inlet clearance is maintained. Failure to do this will affect the blowers airflow (CFM), static pressure (SP) capabilities and efficiency. Consult Cincinnati Fan or our local sales office for your area for assistance if necessary.

D. Vibration:

As mentioned previously in this manual, excessive vibration can cause premature motor bearing failure that could lead to catastrophic failure of the blower. After performing any routine maintenance, the vibration readings should be taken again. New readings should be taken (maximum every 12 months) and compared to the readings you recorded in **Figure 3**, on page 8, during the initial startup. **If any major differences are present, the cause should be determined and corrected before the blower is put back into operation.**

The most common causes of vibration problems are:

1. Wheel unbalance.
2. Mechanical looseness.
3. Poor blower inlet and/or discharge conditions.
4. Foundation stiffness.

E. Dampers and Valves: (Airflow control devices)

Turn off and lock out power to the blower motor. Any dampers or valves should be periodically inspected to make sure all parts are still operable within their full range and there is no interference with any other damper or blower components. Any bearings or seals should be checked for their proper function. The manufacturers maintenance instructions should be followed.

F. Safety Equipment & Accessories:

It is the users responsibility to make sure that all safety guards required by the company, local, state and OSHA regulations are properly attached and fully functional at all times. If any guards become defective or non-functional at any time, **the power to the blower MUST be turned off and locked out** until complete repairs and/or replacements have been made, installed and inspected by authorized personnel.

Any accessories used in conjunction with the blower should also be inspected to make sure they are functioning within their intended limits and design specifications. The manufacturers maintenance manuals should be referred to for correct maintenance procedures. These accessories include, but are not limited to, the following:
Shaft seals, inspection doors, vibration isolators or vibration bases, air flow or pressure measuring equipment, hoods, controls, special coatings, silencers, expansion joints, valves, flexible connectors and filters.

VI. ORDERING REPLACEMENT PARTS:

Under normal conditions, you should not need any spare or replacement parts for at least 24 months after shipment from Cincinnati Fan. That does not include any wear due to abrasion, corrosion, excessive temperatures, abuse, misuse, accident or any severe conditions the fan was not designed for.

NOTICE:

1. **If this blower is vital to any process that could cost you lost revenue, we strongly recommend that you keep a replacement blower wheel and motor at your location.**

2. **If this blower is vital for the safety of any people and/or animals, we strongly recommend that you keep a complete blower/motor assembly, as originally ordered, at your location.**

To order any parts or complete units, contact us for the name of our sales office for your area. Or you can find them on our website at: **www.cincinnatifan.com**

WE MUST HAVE THE BLOWER SERIAL NUMBER FROM THE BLOWER NAME PLATE TO IDENTIFY PARTS CORRECTLY.

VII. TROUBLESHOOTING

⚠ DANGER

Troubleshooting should only be performed by trained personnel. Any potential electrical problems should only be checked by a licensed electrician. All safety rules, regulations and procedures MUST be followed. Failure to follow proper procedures can cause property damage, severe bodily injury and death.

Potential problems and causes listed below are in no order of importance or priority. The causes are only a list of the most common items to check to correct a problem. If you find the cause of a problem, **DO NOT** assume it is the **ONLY** cause of that problem. Different problems can have the same causes.

PROBLEM	CAUSE
Excessive Vibration	1. Loose mounting bolts, wheel set screws, taper-lock hubs. 2. Worn or corroded blower wheel. 3. Accumulation of foreign material on blower wheel. 4. Bent motor shaft. 5. Worn motor bearings. 6. Motor out of balance. 7. Inadequate structural support. 8. Support structure not sufficiently cross braced. 9. Weak or resonant foundation. 10. Foundation not flat and level.
Airflow (CFM) Too Low	1. Blower wheel turning in wrong direction (**rotation**). 2. Actual system static pressure (**SP**) is higher than expected. 3. Motor speed (**RPM**) too low. 4. Dampers or valves not adjusted properly. 5. Leaks or obstructions in duct work. 6. Filters dirty. 7. Inlet and/or discharge guards are clogged. 8. Duct elbow too close to blower inlet and/or discharge. 9. Improperly designed duct work 10. Blower wheel not properly located relative to the inlet bell (**LM** Model only).
Airflow (CFM) Too High	1. Actual system static pressure (**SP**) is lower than expected. 2. Motor speed (**RPM**) too high. 3. Filter not in place. 4. Dampers or valves not adjusted properly.

PROBLEM	CAUSE
Motor Overheating	**NOTE: A normal motor will operate at 174°F. See B-8 on page 6.** 1. Actual system static pressure **(SP)** is lower than expected. 2. Voltage supplied to motor is too high or too low. 3. Motor speed **(RPM)** too high or defective motor. 4. Air density higher than expected. 5. Motor wired incorrectly or loose wiring connections. 6. Cooling fan cover on back of motor is clogged. (Fan cooled motors only.)
Excessive Noise	1. Wheel rubbing inside of housing. 2. Worn or corroded blower wheel. 3. Accumulation of foreign material on blower wheel. 4. Loose mounting bolts, wheel set screws, or taper-lock hubs. 5. Bent motor shaft. 6. Worn motor bearings. 7. Motor out of balance. 8. Motor bearings need lubrication. 9. Vibration originating elsewhere in system. 10. System resonance or pulsation. 11. Inadequate or faulty design of blower support structure. 12. Blower operating near "stall" condition due to incorrect system design or installation.
Fan Doesn't Operate	1. Motor wired incorrectly. 2. Incorrect voltage supply. 3. Defective fuses or circuit breakers. 4. Power turned off elsewhere. 5. Motor wired incorrectly or loose wiring connections. 6. Defective motor.

VIII. LONG TERM STORAGE INSTRUCTIONS: (Storage exceeding 30 days after receipt of equipment)

NOTE: Failure to adhere to these instructions voids all warranties in their entirety.

1. Storage site selection:
   a. Level, well-drained, firm surface, in clean, dry and warm location. Minimum temperature of 50°F (10°C).
   b. Isolated from possibility of physical damage from construction vehicles, erection equipment, etc.
   c. Accessible for periodical inspection and maintenance.
2. The blower should be supported under each corner of its base to allow it to "breath". Supports (2 x 4's, timbers, or railroad ties) should be placed diagonally under each corner.
3. If the equipment is to be stored for more than three (3) months, the entire blower assembly must be loosely covered with plastic, **but not tightly wrapped**.
4. Storage Maintenance:

   A periodic inspection and maintenance log, by date and action taken, must be developed and maintained for each blower. See example below. Each item must be checked monthly.

EXAMPLE:

Storage / Maintenance Schedule Log

ITEM	ACTION	DATES CHECKED
1	Re-inspect units to insure any protective devices used are functioning properly. Check for scratches in the finish which will allow corrosion or rust to form.	
2	Rotate wheel a minimum of 10 full revolutions to keep the motor bearing grease from separating and drying out. *This is a critical step.*	

Long Term Storage instructions continued on page 13.

5. General Motor Procedure:

   If the motor is not put into service immediately, the motor must be stored in a clean, dry, warm location. Minimum temperature of 50°F. (10°C,). Several precautionary steps must be performed to avoid motor damage during storage.

   a. Use a "Megger" each month to ensure that integrity of the winding insulation has been maintained. Record the Megger readings. Immediately investigate any significant drop in insulation resistance.
   b. **DO NOT** lubricate the motor bearings during storage. Motor bearings are packed with grease at the factory.
   c. If the storage location is damp or humid, the motor windings **must** be protected from moisture. This can be done by applying power to the motor's space heaters, (IF AVAILABLE) while the motor is in storage. If the motor does not have space heaters, storing it in a damp or humid location will, very quickly, cause internal corrosion and motor failure which is not warranted.

   ***NOTE*:**
   For specific storage instructions, for the <u>actual</u> motor and any accessory parts that were supplied, refer to the manufacturer's instructions for the motor and other accessory items that were shipped with the blower.

IX. LIMITED WARRANTY:

Cincinnati Fan & Ventilator Company (Seller) warrants products of its own manufacture, against defects of material and workmanship under normal use and service for a period of eighteen (18) months from date of shipment or twelve (12) months from date of installation, whichever occurs first. This warranty does not apply to any of Seller's products or any part thereof which has been subject to extraordinary wear and tear, improper installation, accident, abuse, misuse, overloading, negligence or alteration. This warranty does not cover systems or materials not of Seller's manufacture. On products furnished by Seller, but manufactured by others, such as motors, Seller extends the same warranty as Seller received from the manufacturer thereof. Expenses incurred by Purchaser's in repairing or replacing any defective product will not be allowed except where authorized in writing and signed by an officer of the Seller.

The obligation of the Seller under this warranty shall be limited to repairing or replacing F.O.B. the Seller's plant, or allowing credit at Seller's option. **THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES EITHER EXPRESSED OR IMPLIED INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND OF ALL OTHER OBLIGATIONS AND LIABILITIES OF THE SELLER. THE PURCHASER ACKNOWLEDGES THAT NO OTHER REPRESENTATIONS WERE MADE TO PURCHASER OR RELIED UPON BY PURCHASER WITH RESPECT TO THE QUALITY OR FUNCTION OF THE PRODUCTS HEREIN SOLD.**

Removal of the Sellers nameplate or any generic fan nameplate containing the fan serial number voids all warranties, either written or implied. Failure to complete and document all the pre-startup and post startup checks and perform the suggested routine maintenance checks voids all warranties, either written or implied.

LIMITATION OF LIABILITY:

Notice of any claim, including a claim for defect in material or workmanship, must be given to Seller in writing within 30 days after receipt of the equipment or other products. Seller reserves the right to inspect any alleged defect at Purchaser's facility before any claim can be allowed and before adjustment, credit, allowance replacement or return will be authorized. See **RETURNS** below. Seller's liability with respect to such defects will be limited to the replacement, free of charge, of parts returned at Purchaser's expense F.O.B. Seller's plant and found to be defective by the Seller.

IN NO EVENT WILL SELLER BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, WHETHER IN CONTACT, TORT, NEGLIGENCE, STRICT LIABILITY OR OTHERWISE, INCLUDING WITHOUT LIMITATION DAMAGES FOR INJURY TO PERSONS OR PROPERTY, LOST PROFITS OR REVENUE, LOST SALES OR LOSS OF USE OF ANY PRODUCT SOLD HEREUNDER. PURCHASER'S SOLE AND EXCLUSIVE REMEDY AGAINST SELLER WILL BE THE REPLACEMENT OF DEFECTIVE PARTS AS PROVIDED HEREIN OR REFUND OF THE PURCHASE PRICE FOR DEFECTIVE PRODUCTS, AT SELLER'S SOLE OPTION. SELLER'S LIABILITY ON ANY CLAIM, WHETHER IN CONTRACT, TORT, NEGLIGENCE, STRICT LIABILITY OR OTHERWISE, FOR ANY LOSS OR DAMAGE ARISING OUT OF OR IN CONNECTION WITH PURCHASER'S ORDER OR THE PRODUCTS OR EQUIPMENT PURCHASED HEREUNDER, SHALL IN NO CASE EXCEED THE PURCHASE PRICE OF THE EQUIPMENT GIVING RISE TO THE CLAIM.

RESPONSIBILITY:

It is the understanding of the Seller that Purchaser and/or User will use this equipment in conjunction with additional equipment or accessories to comply with all Federal, State and local regulations. The Seller assumes no responsibility for the Purchaser's or Users compliance with any Federal, State and local regulations.

RETURNS:

Cincinnati Fan & Ventilator Company assumes no responsibility for any material returned to our plant without our permission. An **RMA** (Return Material Authorization) number must be obtained and clearly shown on the outside of the carton or crate and on a packing slip. Any items returned must be shipped freight prepaid. Failure to comply will result in refusal of the shipment at our receiving department.

DISCLAIMER

This manual, and all its content herein, is based on all applicable known material at the time this manual was created. **Any parts of this manual are subject to change at any time and without notice.**

If any statements, diagrams and/or instructions contained herein, **for components not manufactured by the Seller,** conflict with instructions in the manufacturer's manual (i.e.: motors, dampers, etc.), the instructions in the manufacturer's manual, for that component take precedent.

Should you want the latest version of this manual, please contact us or our sales office for your area. Or, you can print a current version by going to our website at: **www.cincinnatifan.com**

cincinnati fan

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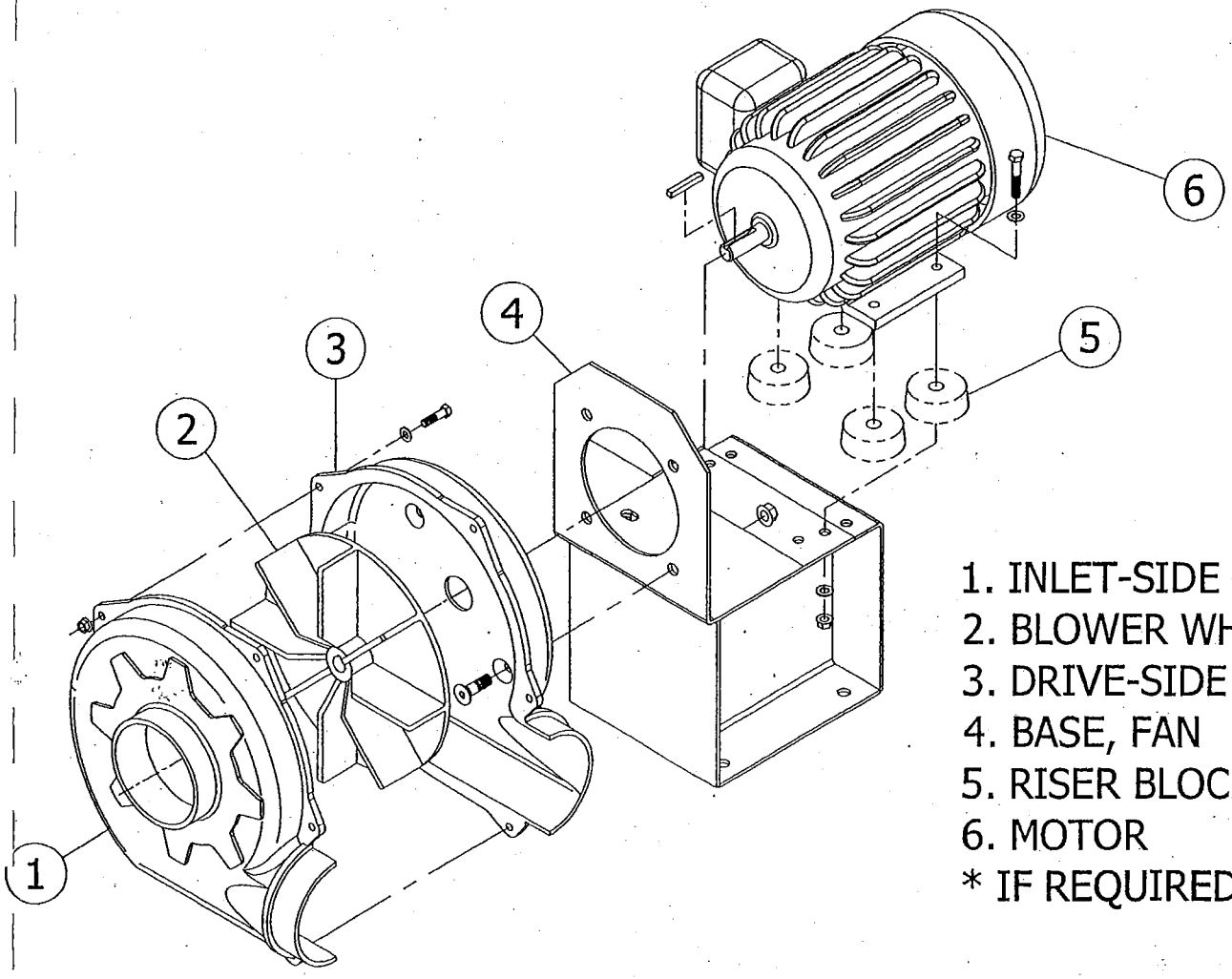
Phone: (513) 573-0600 Fax: (513) 573-0640
E-Mail: sales@cincinnatifan.com



1. INLET-SIDE HOUSING
2. BLOWER WHEEL
3. DRIVE-SIDE HOUSING
4. BASE, FAN
5. RISER BLOCKS*
6. MOTOR

* IF REQUIRED

PB 2-PIECE ARRANGEMENT 4 ASSEMBLY (PB-8 TO PB-12A)

The drawing shown above is a representation of the basic model blower or fan purchased on the serial number shown on page 1. It does not include any optional or accessory parts or any special construction features that might have been supplied with the original order.

cincinnati fan
OEM and Industrial Air Handling Specialist

FAN SELECTION And PERFORMANCE

Friday, June 08, 2007

Job Name: NORTHWEST COMMERCIAL AIR, INC.
Reference: DOE Seattle Quote: 96373

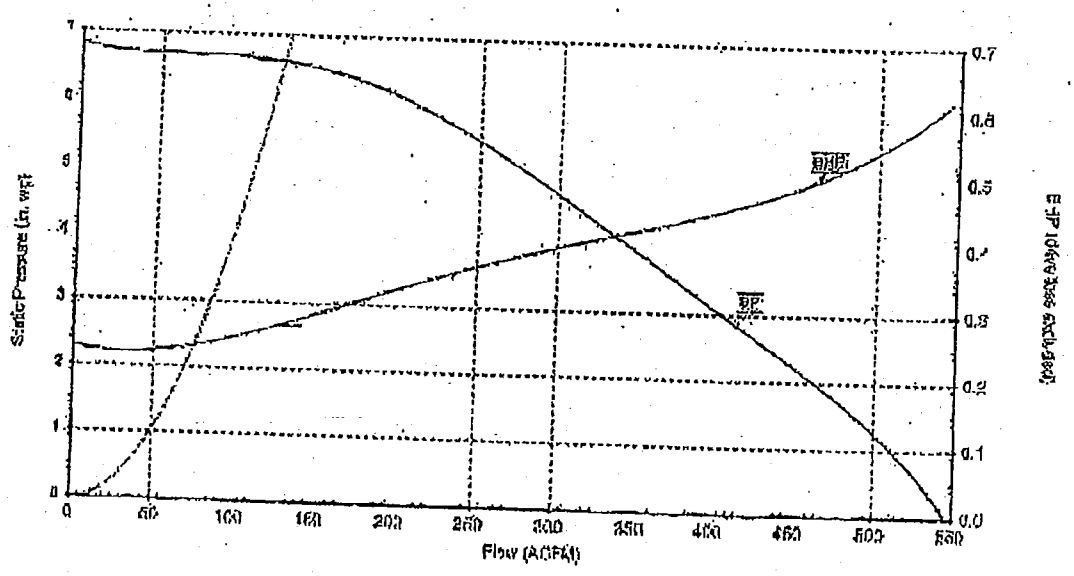
Operating Requirements

Volume, ACFM	125
Static Pressure, in. wg	6.5
Density, lb./ft.³	0.075
Operating Temperature, °F	70
AMCA Arrangement No.	4
Motor Frequency, Hz	60
Start-Up Temperature, °F	70

Fan Selection and Specifications

Model	PB-9
Fan RPM	3,450
Wheel Description	Cast Alum. 10-1/4 X 3 BC
Wheel Width, %	100%
Wheel Diameter, in.	10.25
Inlet Diameter, in.	5.00
Outlet Velocity, ft./min.	1,445
Fan BHP	0.27
Static Efficiency, %	49.6%
Cold Start BHP	0.27
Construction Class	N/A

Cincinnati Fan PB-9 Cast Alum. 10-1/4 X 3 BC Wheel (Full Width) @ 3,450 RPM
Rating Point- 125 ACFM @ 6.5 in. wg SP, 0.075 lb./ft.³ Density, 0.27 BHP, 5.0 in. Inlet



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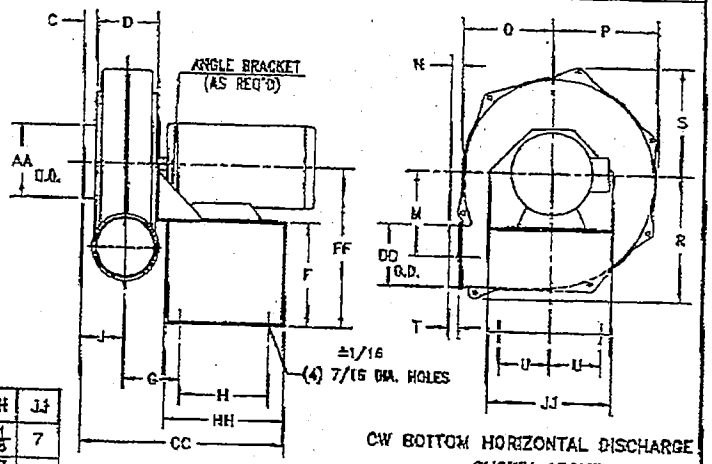
Database Version: 7.2.1

A PB4



CW BOTTOM HORIZONTAL DISCHARGE SHOWN ABOVE

MODEL	FRAME	HOUSING C	D	J	M	N	O	P	R	S	T	AA	DB	F	G	H	U	CC	FF	HH	JJ
PB-8	56	1	3 3/4	2 7/8	4 1/8	1 1/8	4 5/8	5 5/8	7 5/16	4 7/8	1 1/8	4	4	5	3 3/16	5	2 3/4	12 1/8	8 9/16	7 1/8	7
PB-9	56	1 1/16	4 1/8	3 1/8	5 5/8	1 3/16	6 1/8	7 3/8	8 1/2	5 5/8	1	5	4	6 7/8	3 3/8	5 3/4	2 3/4	13 5/16	10 7/16	7 7/8	7
	143T-145T													8 1/4	4 3/16	5	3 3/4	13 13/16	11 7/8	8	9
PB-10A	56	1 1/4	4 1/4	3 3/8	6 9/16	1	6 7/8	9 7/16	10 3/16	7 13/16	1	6	5	6 7/8	3 7/16	5 3/4	2 3/4	13 11/16	10 7/16	7 7/8	7
	143T-145T													8 1/4	4 1/4	5	3 3/4	14 1/8	11 7/8	8	9
PB-12A	56	1 1/4	5	3 3/4	7 9/16	7/8	8	9 5/8	11 11/16	9 7/16	1	7	6	8 1/4	4 1/4	5	3 3/4	14 1/2	11 7/8	8	9
	143T-145T													8 1/4	4 5/8	5	3 3/4	14 7/8		8	9
	182T-184T													6 7/16	5	8 3/4	4 15/16	19		11 3/4	12
PB-14A	56	1 1/4	6	4 1/4	8 1/16	1	8 13/16	10 3/8	12 3/16	10 1/4	1	7	6	8 15/16	5 1/2	8 3/4	4 15/16	20	15 3/16	11 3/4	12
	143T-145T																				
	182T-213T																				
PB-15A	143T-145T	1 1/4	7 1/4	4 7/8	7 7/8	1	9 13/16	11 3/8	13	10 13/16	1	8	8	9 15/16	6 1/8	8 3/4	4 15/16	21 1/4	15 3/16	11 3/4	12
	182T-184T																				
	213T-215T																				
	254T-256T													8 15/16		13		25 1/2		16	16 1/2
PB-18	143T-145T	1 1/4	6 1/4	4 3/8	10 1/2	15/16	10 1/2	12 11/16	14 1/2	12 7/16	1	8	6	9 15/16	5 5/8	8 3/4	4 15/16	20 1/4	15 3/16	11 3/4	12
	182T-184T																				
	213T-215T																				
	254T-256T													8 15/16		13		24 1/2		16	16 1/2
PB-18WA	182T-184T	1 1/4	8 1/16	5 5/16	9 7/8	7/8	11	13 3/16	15 1/8	11 13/16	1	10	6	12 3/4	6 1/2	10 3/4	6 1/2	24 1/16	18	13 3/4	16 1/2
	213T-215T													11 3/4		15 3/4		29 1/16		18 3/4	
	254T-256T													11							
	284T-286T																				

OPTIONAL INLET SIZES

- ☐ 6" INLET AVAILABLE FOR PB-14A, PB-15A & PB-18
- ☐ 7" INLET AVAILABLE FOR PB-15A
- ☐ 8" INLET AVAILABLE FOR PB-14A & PB-18WA
- ☐ 10" INLET AVAILABLE FOR PB-15A & PB-18

NOTES:
1. HOUSINGS ARE ROTATABLE IN 45° INCREMENTS.
2. ALL MODELS: DISCHARGE FLANGE NOT AVAILABLE FOR DOWN BLAST DISCHARGE.

cincinnati fan
7697 SNIDER ROAD MASON, OHIO 45040

TOLERANCES: ANGLES: ± 1° FRACTIONS ±1/8 ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED

SUPERSEDES:

CERTIFIED DRAWING

TITLE: PB BLOWERS – ARR. 4 | A | DRAWING NO. PB4 | REV. 1

Flex-Tube® Manometer

Installation & Operating Instructions

1220/1230 Series

U-Tube and Well-Type Manometers

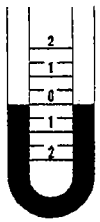


Fig. 1

With both ends of the tube open, the liquid is at the same height in each leg.

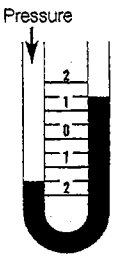


Fig. 2

The difference in height, "h", which is the sum of the readings above and below zero, indicates pressure.

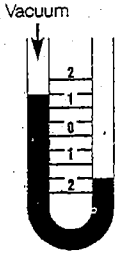


Fig. 3

The difference in height, "h", which is the sum of the readings above and below zero, indicates the amount of vacuum.

Measuring Pressure, Vacuum and Differential Pressure with Dwyer Manometers

Dwyer manometers are available in two different styles. The W/M models use either water for readings in inches of water or mercury for readings in inches of mercury. The D models use Dwyer .826 specific gravity red gage oil for readings in inches of water. The scales on the two styles have different lengths, so it is important to use the correct fluid.

Mounting Dwyer U-Tube Manometers

1221 – Mount to a vertical surface through holes in the scale.

1222 – Attach magnets to steel surface or remove magnets and mount through holes in scale.

1223 – Attach magnets to steel surface or through the hole in safety trap housing.

1227 – Because of angled connections, 1227 must be filled with indicating tube at an angle. After filling, check zero in vertical position.

Note: Read vertical range on the right leg with the manometer vertical. Incline the manometer to zero for low range reading.

Mounting Dwyer Well Manometers

1230 – Mount to a vertical surface with flat-head screws through the holes in the scale.

1235 – Mount behind panel cutout to show only the tube and scale. Attach by drilling holes through the manometer's back-plate and panels. Make the panel cutout for the length and width of the tube and scale.

DWYER INSTRUMENTS, INC
P.O. BOX 373 • MICHIGAN CITY, INDIANA 46361 U.S.A.
Phone: 219/879-8000 www.dwyer-inst.com
Fax: 219/872-9057 e-mail: info@dwyer-inst.com
Hi-Pry Fax: 888/891-4963

Bulletin D-21

Filling U-Tube Manometers 1221 – 1222

Open both fittings to atmosphere. Slide scale to mid-point of travel. Add liquid to zero on scale.

Filling 1223 – 1230 and 1235 Manometers

Remove large fitting from well using a 3/4" open-end wrench. Also remove cork, disc, and O-ring. Be sure the other side is vented to atmosphere. Adjust zero to middle of travel. Add fluid to well up to the zero on scale. Replace cork, disc, and O-ring before replacing fitting. To order red gage oil, order part # A-101 (3/4 oz.) To order fluorescein green color concentrate, order part # A-126 (3/4 oz.)

Operation of 1221, 1222 and 1223 Manometers

Connect either side to pressure or vacuum, leaving the other side open to atmosphere. Add together the readings above and below zero.

It is normal for the two sides to have different readings and has no effect on accuracy. For differential pressure, connect both the high and low fittings. Add the readings above and below zero on the scale.

Operation of 1230 and1235 Manometers

Positive Pressure: Connect the well reservoir fitting to the pressure source, leaving the other side open to atmosphere.

Negative Pressure: Connect the top fitting to vacuum source, leaving well side open to atmosphere.

Differential Pressure: Connect higher pressure to well reservoir fitting and lower pressure to upper fitting.

Note: When finished, close fitting to prevent spilling or evaporation.

Maintenance

With proper care, Dwyer Flex-Tube® Manometers will continue to give accurate readings. If cleaning is needed, remove fittings, drain fluid, and rinse with mild soap and water. A cleaning brush (part #A-366) may be used to remove oxidation.

Avoid harsh soaps and solvents which may damage manometer and void warranty.

When replacing O-rings, apply a thin coat of petroleum jelly to assure a good seal. Do not coat O-ring used in the overpressure safety trap.

Avoid using fluids other than those specified. Corrosive fluids may damage the manometer.

 Printed in U.S.A. 6/01 FR# 44-440475-00 Rev. 4

DWYER INSTRUMENTS, INC
P.O. BOX 373 • MICHIGAN CITY, INDIANA 46361 U.S.A.
Phone: 219/879-8000 www.dwyer-inst.com
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Hi-Pry Fax: 888/891-4963

VAPOR SYSTEM INSPECTION FORM

Sub-Slab Soil Vapor Depressurization System
220 South Dawson Street, Seattle, Washington

Performed by: Daniel Arcieri Date: _____

Piping Check	**Yes**	**No**
System suction points are sealed?		
Piping system is properly supported?		
Excessive noise is heard in piping joints?		
Valves & manometers installed?		
Vacuum > 0.1" observed at all manometers?		
Correct labels applied in proper location?		

Electrical Check		
Is fan in operation?		
Excessive noise heard when fan is running?		
Electrical junction box all closed?		
Electrical conduit properly supported?		
Correct labels applied in proper location?		

Have the following items changed since the last visit?		
Building support structures or footprint		
Heating/Ventilating Systems		
Drains, Sumps, Floor Cracks		
Wall Penetrations, Cracks		

Manometer readings:

	Pressure (inches of H20)		
	Left side	**Right side**	**Total**
VIMS-1			
VIMS-3			
VIMS-4			
VIMS-5A			
VIMS-5B			

Comments:

_____
_____
_____
_____
_____

VAPOR SYSTEM INSPECTION FORM

Sub-Slab Soil Vapor Depressurization System
220 South Dawson Street, Seattle, Washington

Appendix E

RETEC Weekly Reports

VAPOR SYSTEM INSPECTION FORM

Sub-Slab Soil Vapor Depressurization System
220 South Dawson Street, Seattle, Washington

Performed by: Daniel Arcieri Date: 8-10-07

Piping Check	**Yes**	**No**
System suction points are sealed?	X	
Piping system is properly supported?	X	
Excessive noise is heard in piping joints?		X
Valves & manometers installed?	X	
Vacuum > 0.1" observed at all manometers?	X	
Correct labels applied in proper location?	X	

Electrical Check		
Is fan in operation?	X	
Excessive noise heard when fan is running?		X
Electrical junction box all closed?	X	
Electrical conduit properly supported?	X	
Correct labels applied in proper location?	X	

Have the following items changed since the last visit?		
Building support structures or footprint		X
Heating/Ventilating Systems		X
Drains, Sumps, Floor Cracks		X
Wall Penetrations, Cracks		X

Manometer readings:

	Pressure (inches of H20)		
	Left side	**Right side**	**Total**
VIMS-1	2.6	2.6	5.2
VIMS-3	2.7	2.8	5.5
VIMS-4	2.6	2.6	5.2
VIMS-5A	2.8	2.7	5.5
VIMS-5B	2.85	2.9	5.75

Comments:

VAPOR SYSTEM INSPECTION FORM

Sub-Slab Soil Vapor Depressurization System
220 South Dawson Street, Seattle, Washington

VAPOR SYSTEM INSPECTION FORM

Sub-Slab Soil Vapor Depressurization System
220 South Dawson Street, Seattle, Washington

Performed by: Daniel Arcieri Date: 8-14-07

Piping Check	**Yes**	**No**
System suction points are sealed?	X	
Piping system is properly supported?	X	
Excessive noise is heard in piping joints?		X
Valves & manometers installed?	X	
Vacuum > 0.1" observed at all manometers?	X	
Correct labels applied in proper location?	X	

Electrical Check		
Is fan in operation?	X	
Excessive noise heard when fan is running?		X
Electrical junction box all closed?	X	
Electrical conduit properly supported?	X	
Correct labels applied in proper location?	X	

Have the following items changed since the last visit?		
Building support structures or footprint		X
Heating/Ventilating Systems		X
Drains, Sumps, Floor Cracks		X
Wall Penetrations, Cracks		X

Manometer readings:

	Pressure (inches of H20)		
	Left side	**Right side**	**Total**
VIMS-1	2.65	2.60	5.25
VIMS-3	2.65	2.8	5.45
VIMS-4	2.6	2.6	5.2
VIMS-5A	2.8	2.65	5.45
VIMS-5B	2.85	2.9	5.75

Comments:

VAPOR SYSTEM INSPECTION FORM

Sub-Slab Soil Vapor Depressurization System
220 South Dawson Street, Seattle, Washington

VAPOR SYSTEM INSPECTION FORM

Sub-Slab Soil Vapor Depressurization System
220 South Dawson Street, Seattle, Washington

Performed by: Daniel Arcieri Date: 8-24-07

Piping Check	**Yes**	**No**
System suction points are sealed?	X	
Piping system is properly supported?	X	
Excessive noise is heard in piping joints?		X
Valves & manometers installed?	X	
Vacuum > 0.1" observed at all manometers?	X	
Correct labels applied in proper location?	X	

Electrical Check		
Is fan in operation?	X	
Excessive noise heard when fan is running?		X
Electrical junction box all closed?	X	
Electrical conduit properly supported?	X	
Correct labels applied in proper location?	X	

Have the following items changed since the last visit?		
Building support structures or footprint		X
Heating/Ventilating Systems		X
Drains, Sumps, Floor Cracks		X
Wall Penetrations, Cracks		X

Manometer readings:

	Pressure (inches of H20)		
	Left side	**Right side**	**Total**
VIMS-1	2.6	2.6	5.2
VIMS-3	2.7	2.8	5.5
VIMS-4	2.65	2.65	5.3
VIMS-5A	2.8	2.65	5.45
VIMS-5B	2.9	2.95	5.85

Comments:

VAPOR SYSTEM INSPECTION FORM

Sub-Slab Soil Vapor Depressurization System
220 South Dawson Street, Seattle, Washington

VAPOR SYSTEM INSPECTION FORM

Sub-Slab Soil Vapor Depressurization System
220 South Dawson Street, Seattle, Washington

Performed by: Daniel Arcieri Date: 8-27-07

Piping Check	**Yes**	**No**
System suction points are sealed?	X	
Piping system is properly supported?	X	
Excessive noise is heard in piping joints?		X
Valves & manometers installed?	X	
Vacuum > 0.1" observed at all manometers?	X	
Correct labels applied in proper location?	X	

Electrical Check		
Is fan in operation?	X	
Excessive noise heard when fan is running?		X
Electrical junction box all closed?	X	
Electrical conduit properly supported?	X	
Correct labels applied in proper location?	X	

Have the following items changed since the last visit?		
Building support structures or footprint		X
Heating/Ventilating Systems		X
Drains, Sumps, Floor Cracks		X
Wall Penetrations, Cracks		X

Manometer readings:

	Pressure (inches of H20)		
	Left side	**Right side**	**Total**
VIMS-1	2.65	2.65	5.3
VIMS-3	2.65	2.75	5.4
VIMS-4	2.7	2.7	5.4
VIMS-5A	2.7	2.7	5.4
VIMS-5B	2.85	2.95	5.8

Comments:

VAPOR SYSTEM INSPECTION FORM

Sub-Slab Soil Vapor Depressurization System
220 South Dawson Street, Seattle, Washington

VAPOR SYSTEM INSPECTION FORM

Sub-Slab Soil Vapor Depressurization System
220 South Dawson Street, Seattle, Washington

Performed by: Daniel Arcieri Date: 9-6-07

Piping Check	**Yes**	**No**
System suction points are sealed?	X	
Piping system is properly supported?	X	
Excessive noise is heard in piping joints?		X
Valves & manometers installed?	X	
Vacuum > 0.1" observed at all manometers?	X	
Correct labels applied in proper location?	X	

Electrical Check		
Is fan in operation?	X	
Excessive noise heard when fan is running?		X
Electrical junction box all closed?	X	
Electrical conduit properly supported?	X	
Correct labels applied in proper location?	X	

Have the following items changed since the last visit?		
Building support structures or footprint		X
Heating/Ventilating Systems		X
Drains, Sumps, Floor Cracks		X
Wall Penetrations, Cracks		X

Manometer readings:

	Pressure (inches of H20)		
	Left side	**Right side**	**Total**
VIMS-1	2.65	2.65	5.3
VIMS-3	2.8	2.9	5.7
VIMS-4	2.7	2.7	5.4
VIMS-5A	2.75	2.75	5.5
VIMS-5B	2.9	2.96	5.8

Comments:

VAPOR SYSTEM INSPECTION FORM

Sub-Slab Soil Vapor Depressurization System
220 South Dawson Street, Seattle, Washington

VAPOR SYSTEM INSPECTION FORM

Sub-Slab Soil Vapor Depressurization System
220 South Dawson Street, Seattle, Washington

Performed by: Daniel Arcieri Date: 9-10

Piping Check	**Yes**	**No**
System suction points are sealed?	X	
Piping system is properly supported?	X	
Excessive noise is heard in piping joints?		X
Valves & manometers installed?	X	
Vacuum > 0.1" observed at all manometers?	X	
Correct labels applied in proper location?	X	

Electrical Check		
Is fan in operation?	X	
Excessive noise heard when fan is running?		X
Electrical junction box all closed?	X	
Electrical conduit properly supported?	X	
Correct labels applied in proper location?	X	

Have the following items changed since the last visit?		
Building support structures or footprint		X
Heating/Ventilating Systems		X
Drains, Sumps, Floor Cracks		X
Wall Penetrations, Cracks		X

Manometer readings:

	Pressure (inches of H20)		
	Left side	**Right side**	**Total**
VIMS-1	2.55	2.6	5.15
VIMS-3	2.7	2.8	5.5
VIMS-4	2.6	2.65	5.25
VIMS-5A	2.8	2.75	5.55
VIMS-5B	2.8	2.85	5.65

Comments:

VAPOR SYSTEM INSPECTION FORM

Sub-Slab Soil Vapor Depressurization System
220 South Dawson Street, Seattle, Washington

VAPOR SYSTEM INSPECTION FORM

Sub-Slab Soil Vapor Depressurization System
220 South Dawson Street, Seattle, Washington

Performed by: Daniel Arcieri Date: 9-21-05

Piping Check

	Yes	No
System suction points are sealed?	X	
Piping system is properly supported?	X	
Excessive noise is heard in piping joints?		X
Valves & manometers installed?	X	
Vacuum > 0.1" observed at all manometers?	X	
Correct labels applied in proper location?	X	

Electrical Check

Is fan in operation?	X	
Excessive noise heard when fan is running?		X
Electrical junction box all closed?	X	
Electrical conduit properly supported?	X	
Correct labels applied in proper location?	X	

Have the following items changed since the last visit?

Building support structures or footprint		X
Heating/Ventilating Systems		X
Drains, Sumps, Floor Cracks		X
Wall Penetrations, Cracks		X

Manometer readings:

	Pressure (inches of H20)		
	Left side	Right side	Total
VIMS-1	2.65	2.65	5.3
VIMS-3	2.7	2.75	5.45
VIMS-4	2.6	2.65	5.25
VIMS-5A	2.8	2.7	5.5
VIMS-5B	2.85	2.95	5.8

Comments:

VAPOR SYSTEM INSPECTION FORM

Sub-Slab Soil Vapor Depressurization System
220 South Dawson Street, Seattle, Washington

VAPOR SYSTEM INSPECTION FORM

Sub-Slab Soil Vapor Depressurization System
220 South Dawson Street, Seattle, Washington

Performed by: Daniel Arcieri Date: 10-5-07

Piping Check	**Yes**	**No**
System suction points are sealed?	X	
Piping system is properly supported?	X	
Excessive noise is heard in piping joints?		X
Valves & manometers installed?	X	
Vacuum > 0.1" observed at all manometers?	X	
Correct labels applied in proper location?	X	

Electrical Check		
Is fan in operation?	X	
Excessive noise heard when fan is running?		X
Electrical junction box all closed?	X	
Electrical conduit properly supported?	X	
Correct labels applied in proper location?	X	

Have the following items changed since the last visit?		
Building support structures or footprint		X
Heating/Ventilating Systems		X
Drains, Sumps, Floor Cracks		X
Wall Penetrations, Cracks		X

Manometer readings:

	Pressure (inches of H20)		
	Left side	**Right side**	**Total**
VIMS-1	2.6	2.7	5.3
VIMS-3	2.7	2.7	5.4
VIMS-4	2.55	2.65	5.2
VIMS-5A	2.8	2.65	5.45
VIMS-5B	2.85	2.95	5.8

Comments:

VAPOR SYSTEM INSPECTION FORM

Sub-Slab Soil Vapor Depressurization System
220 South Dawson Street, Seattle, Washington

Appendix F

ART Certification of Completion

ADVANCED RADON TECHNOLOGIES, INC.
RADON MITIGATION & TESTING
WA ST. CONTR LIC# ADVANRT06402

2801 N. Monroe Street, Suite "A" Spokane, WA 99205 Phone: (509) 326-5127 Fax: (509) 328-2927

Certificate of Completion

October 11, 2007

ENSR Corporation (RETEC)
Jamie Stevens
1011 SW Klickitat Way # 207
Seattle, WA 98134

Jamie:

The Radon system was installed at 220 S Dawson Street per the original design pending the remodel by the current owner.

Thank you,

Mark S Gerard

Mark S Gerard , Owner
Advanced Radon Technologies, Inc.
2801 N Monroe
Spokane, WA 99205