Development Services

From Concept to Construction

PHONE: 503-823-7300
TTY: 503-823-6868
1900 SW 4th Ave, Portland, OR 97201

APPEAL SUMMARY

Status:

Appeal ID: 6678	**Project Address:** 539 SE 59th Ct
Hearing Date: 11/4/09	**Appellant Name:** Tad Everhart
Case No.: P-006	**Appellant Phone:** 503-239-8961
Appeal Type: Plumbing	**Plans Examiner/Inspector:** McKenzie James
Project Type: residential	**Stories:** 2 **Occupancy:** R-3 **Construction Type:** V-B
Building/Business Name:	**Fire Sprinklers:**
Appeal Involves: Alteration of/additional to an existing structure	**LUR or Permit Application No.:** 09-156160-RS
Plan Submitted Option: mail [File 1]	**Proposed use:** Single family residence

APPEAL INFORMATION SHEET

Appeal item 1

Code Section	2008 Oregon Plumbing Specialty Code, Section 906.0 Vent Termination
Requires	Vent via roof stacks to relieve positive and negative pressure in waste plumbing system.
Proposed Design	I wish to install Studor air admittance valves ("AAVs") for all fixtures in our house according to international code approvals (2003 and 2006 International Plumbing Code and International Residential Code) and the manufacturer's recommendations which will include more than 3 AAVs in the residence and more than one fixture on each AAV. These will be in lieu of through- roof vent stacks to handle negative pressure in the waste system. To relieve any positive pressure in the system which occurs from the public sanitary sewer system, I wish to install a Studor charcoal-filtered two-way vent ("Maxi-Filtra") as the cap of the clean-out which is located about 16" outside the foundations and at least 10' from an operable window.
Reason for alternative	We wish to retrofit our home's building envelope so that it is virtually air-tight and super-insulated (by conventional building standards) as part of trying to meet the Passive House design and certification standards. This will make our house more sustainable. By installing AAVs, we can reduce penetrations in the air-tightness barrier of the house. Currently, we have 7 plumbing stacks that penetrate the ceiling for vents serving our 3 bathrooms, 1 kitchen, and 1 laundry hookup. Each of these penetrations is virtually impossible to make air tight. We wish to remove these vents, install AAVs, and seal the penetrations to make the house more air-tight. Another benefit of the AAV is that it reduces the need for insulation. In a low-energy building such as a Passive House, all penetrations in the envelope that allow ambient air to flow into the vent piping inside the envelope. This contributes to the heating load in winter and the cooling load in summer. To counteract this, you must insulate the vents both in the attic as well as inside the conditioned space to reduce heat transfer through the vent piping. The City's Alternative Technology Advisory Committee found that our proposed use of AAVs and the

two-way exterior vent was more sustainable than through-roof venting and recommended approval of our plumbing code appeal. I have attached a copy of that recommendation.

This appeal incorporates by reference the materials we submitted to the ATAC as well as the evidence we produced during the hearing. If you wish, we can provide another copy of the materials we submitted to the ATAC.

Additionally, I believe Terry Whitehill of BDS is an ex officio member of the ATAC. Mr. Whitehill was present during the ATAC hearing and had an opportunity to review the evidence we submitted. I believe that if asked, Mr. Whitehill will be able to provide information to support this appeal.

APPEAL DECISION

1. Air admittance valves in lieu of plumbing waste vents through roof: Granted as proposed.

City of Portland, Oregon
Bureau of Development Services

1900 SW 4th Avenue, Suite 5000
Portland, Oregon 97201
503-823-7300
Fax 503-823-6983
TTY 503-823-6868
www.portlandonline.com/bds

To: **Tad Everhart**

From: **Alternative Technology Advisory Committee:**
Edward Vranizan (chair), Samir Mokashi (vice-chair), Kathy Bash, Peter Dusicka, Aron Faegre, Ron Hays, Joshua Klyber

RE: **Application #09-003 (Everhart) – Final Recommendation**

Date: **September 16, 2009**
Revised: **October 19, 2009**

Summary of Proposal: Plumbing waste piping systems are required to be vented to equalize air pressure within the piping. The applicant proposes to install Air Admittance Valves (AAVs) inside the building envelope, in lieu of conventional through-roof plumbing waste vent stacks throughout a single-family dwelling being designed using high-efficiency Passive House standards. AAVs are one-way valves that allow air to enter the waste piping to relieve negative pressure, installed in the same locations as required for conventional relief vents. Potential positive back-pressure from the sewer main is proposed to be relieved by a two-way vent with a replaceable carbon filter cartridge installed near grade level where the main waste line exits the house. The AAVs and two-way vents are manufactured by Studor, Inc.

Applicable Building Code Section(s): 2008 Oregon Plumbing Specialty Code, Section 906.0 Vent Termination.

Committee Findings:

1. The 2003 and 2006 International Plumbing Code and International Residential Code allow AAVs in commercial and residential applications.

2. Use of AAVs in lieu of through-roof vent stacks will increase energy conservation by reducing heat loss from the building and reducing construction materials.

3. Penetrations of the building envelope are a major source of condensation and rot problems over time in a building, so reducing their number is advantageous to maximizing building lifetime.

4. Conventional through-roof vent stacks must terminate above the roof to prevent sewer gasses from entering the house. AAVs do not allow sewer gasses to enter the house. Positive back-pressure is relieved outside the house through a two-way valve with a carbon filter.

5. Studor AAVs have been listed by American Society of Sanitary Engineering since 1993 (ASSE 1051)

Final Committee Recommendation:
Based on these findings the Alternative Technology Advisory Committee recommends approval of this technology. The Bureau of Development Services' Administrative Appeal Board is encouraged to approve subsequent building code appeals based on the information provided in this application.

Please note: The Bureau of Development Services (BDS) and its Administrative Appeal Board is not bound by the recommendations of the Committee. A favorable recommendation of a technology by the Committee does not guarantee approval of a building code appeal.

Further instructions for the applicant:
You may submit your building code appeal to use this technology in a site-specific project at any time by following the instructions found on the BDS website. A building code appeal must be approved by BDS to be able to use this technology in a project. Please submit a copy of this committee recommendation with your appeal application. Please contact the Appeal Board Secretary at (503) 823-7335 if you have any additional questions about the appeal process.

Lee & Son's Plumbing, Inc.
2025 NW Sierra Lane
Camas, Wash. 98607
CCB3 173495 PB# 273
Off. 360-834-0704, Fax 360-834-0705, Email leeandsonsplumbing@comcast.net

From the desk of Lee D. Pine
Presently; Journeyman Plumber & Estimator for Lee & Sons Plumbing, Inc.
Founder & previous owner of Lee & Sons Plumbing, Inc.
Phone # 360-574-2122. Fax 360-574-2626

To whom this may concern: 08-28-09

As the diagram indicates, the residence presently has a total of 3 vents that penetrate the roof. It would be quite simple to replace the piping penetrations of the roof and the piping that is presently in the walls, with the "Studor", (AAVs) "Air Admittance Valves". That is of course, with the approval of Local Authorities.

Since this residence has been established for a few years, it would require several more AAVs than would normally recommended by the manufacturer. The AAVs could be installed is several different locations. Each AAV would be readily available for viewing or replacement (if necessary), by having it installed in a "in wall" mounting box, with a removable grill. In the case of the Laves, these could be mounted above the "P-Trap" arm, or for the kitchen sink, above the drainage tee & "P-Trap' arm". No penetrations would be required for the new system and removal of the existing vent system could be easily handled during the remodel.

Allowing for the difference between the manufacturers specifications for air flow and the UPC specifications for the same, I would hope to at least see a compromise between the two. In addition, as indicated in the information and specifications brochure; a back-pressure positive relief (Maxi Filtra) for the street sewer system; could be installed on the outside cleanout, through the use of a "Y" branch ftg., and a male or female adapter with a riser to prevent any "backfill" from clogging the device.

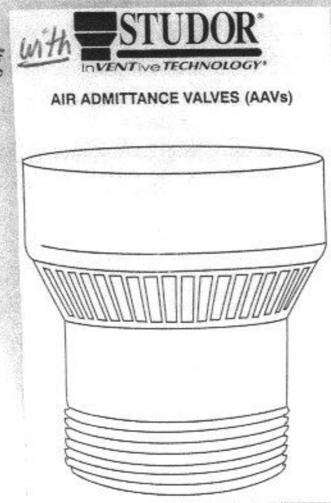
Respectfully,

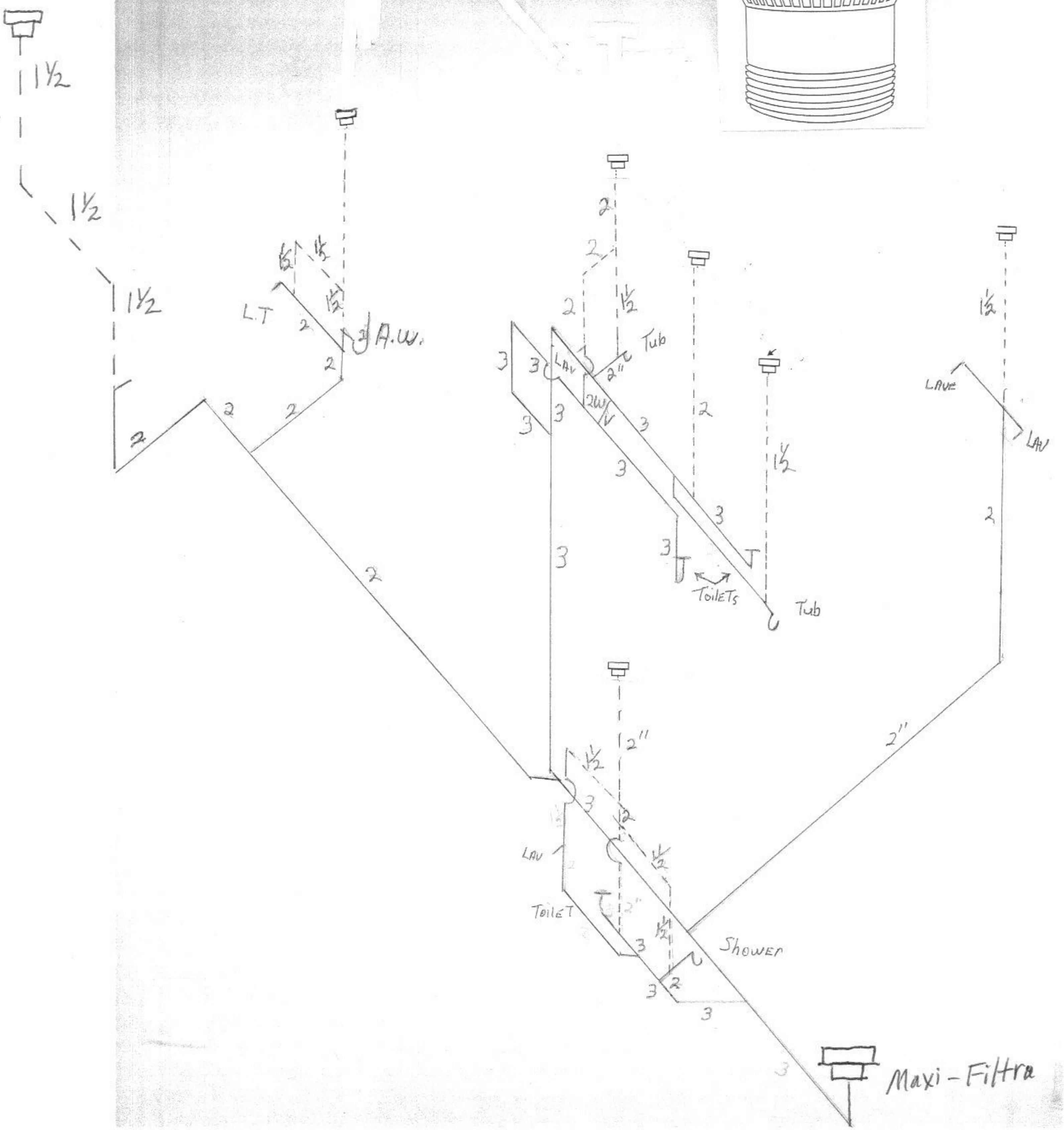
Lee D. Pine

Lee D. Pine, Estimator

Lee Pine Schematic for

New Applicable Drainage & Vent System ~~xisting~~ with STUDOR ~~tem~~



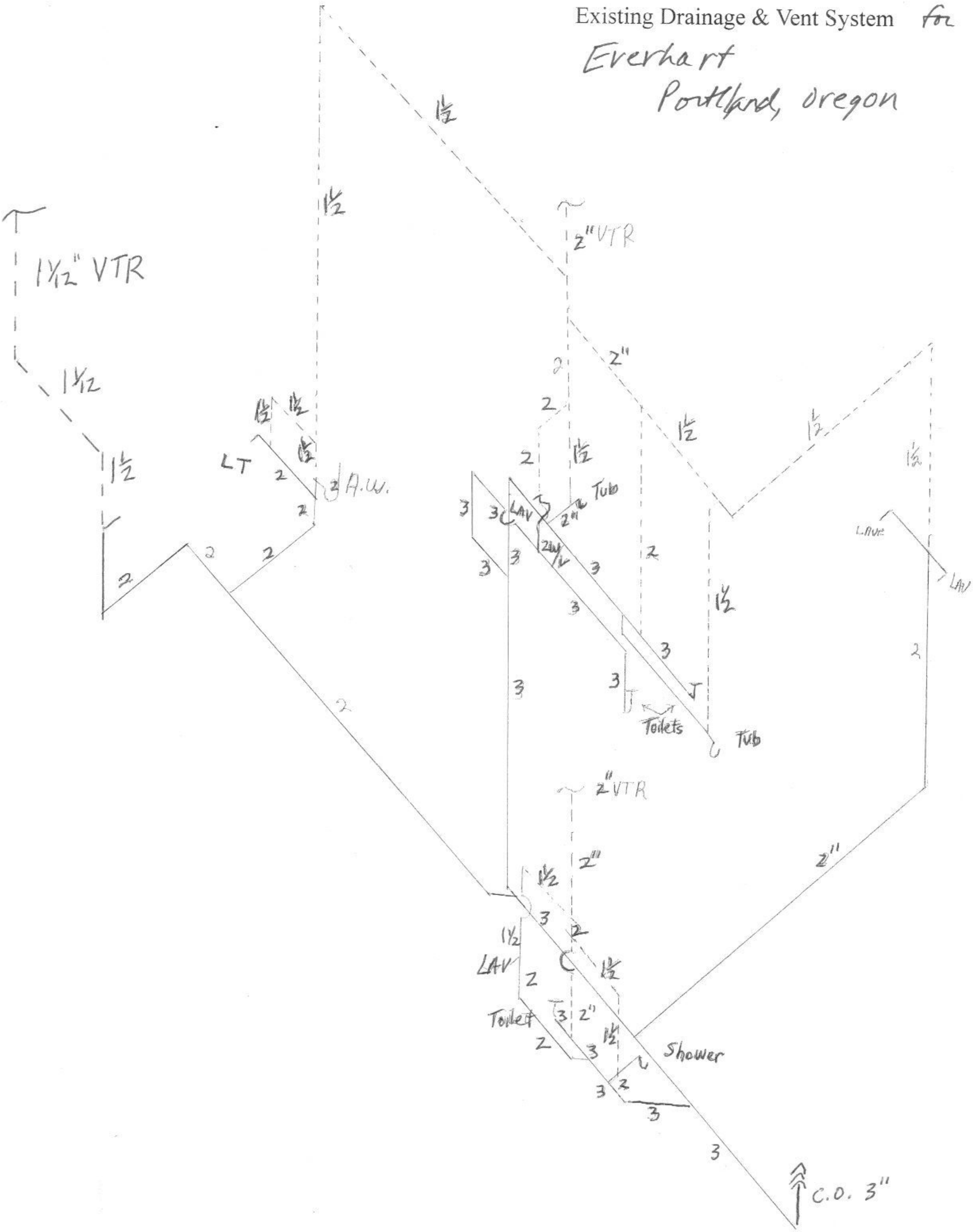


Lee Pine Schematic

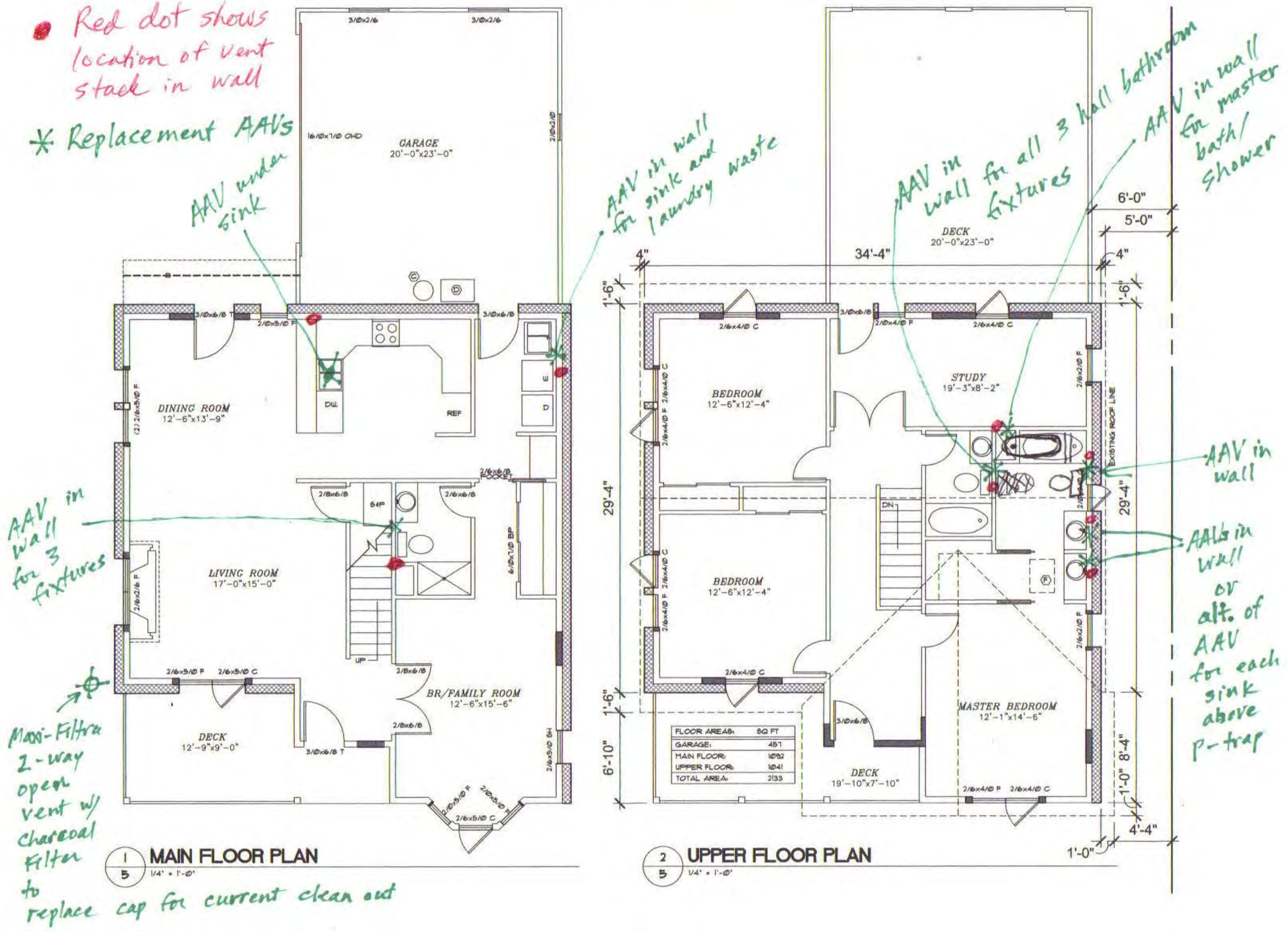
Existing Drainage & Vent System for

Everhart

Portland, oregon



Everhart Passive House Retrofit 11/1/09

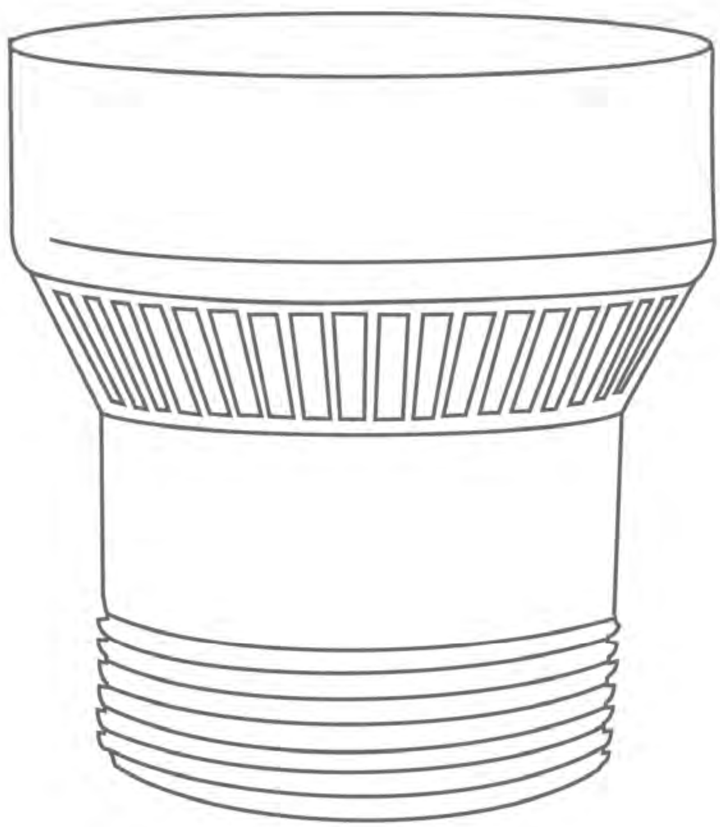


DESIGN CRITERIA AND INSTALLATION INSTRUCTIONS FOR

STUDOR®

InVENTive TECHNOLOGY®

AIR ADMITTANCE VALVES (AAVs)



DESIGN CRITERIA AND INSTALLATION INSTRUCTIONS FOR STUDOR AIR ADMITTANCE VALVES (AAVs)

Product Manufactured:
Air Admittance Valves

Product Trade Name:
Studor Mini-Vent, Maxi-Vent,
Redi-Vent, Tec-Vent and Ultra-Vent

Purpose:

The purpose of this report is to review the acceptability of Studor's air admittance valves to serve as a vent for a sanitary drainage, waste, and vent (DWV) system.

Abstract:

To prevent sewer gases from emanating into a building, every plumbing fixture connected to the sanitary drainage system is protected with a water trap seal. The fixture trap seal must be protected against pressure differentials in the drainage system that can cause the loss of the trap seal.

The common method of protecting the trap seal is the installation of a vent system that provides an open pipe connection to the outdoor air. The vent system is designed to protect the trap seal from both low pressure and high pressure conditions.

While the open piped vent system is the most widely accepted method of protecting a trap seal, other methods have also been developed. The air admittance valve is one such method that provides protection of the trap seal. When used properly, an air admittance valve installed in the system is equivalent to an open pipe vent.

Code Acceptance:

AAVs are permitted by Section 917 of the International Plumbing Code (IPC), Section P3114 of the International Residential Code (IRC) and Section 301.2, Alternate Materials and Methods of the Uniform Plumbing Code. The valves may serve as the vent for individual, branch, and stack vent applications.

The standards regulating air admittance valves are ANSI/ASSE 1050 for stack venting, ANSI/ASSE1051 for single fixture and branch venting and NSF 14 for plastic piping system components and related materials.

Product Description:

The Studor Mini-Vent, Redi-Vent, Tec-Vent and Ultra-Vent are designed for pipe sizes 1½ inch through 2 inch. The Studor Maxi-Vent is designed for pipe sizes 3 inch through 4 inch.

A full description of the Studor Air Admittance Valves is contained in the manufacturer's technical literature.

Standards:

1. ANSI/ASSE 1050 Performance Requirements for stack type air admittance valves for sanitary drainage systems.
2. ANSI/ASSE 1051 Performance Requirements for individual and branch type air admittance valves for sanitary drainage systems.
3. NSF 14 plastic piping system components and related materials.

Listings:

1. American Society of Sanitary Engineering (ASSE)
2. NSF International (NSF)
3. National Evaluation Services, Inc. (NES) - NER-592
4. Intertek Testing Services (ITS) - Warnock Hersey
5. Underwriters Laboratories, Inc. (UL) - File NO. R20814
6. International Association of Plumbing and Mechanical Officials (IAPMO) - File NO. C-3803

Technical Application:

An air admittance valve is designed to permit air to enter the drainage system when the pressure within the piping system drops below atmospheric pressure. The valve thus prevents the fixture trap seal from being siphoned.

Both field investigation and laboratory testing have shown that the primary cause of the loss of the water trap seal is siphonage or self-siphonage. The other leading cause is evaporation due to lack of use.

The venting methods with air admittance valves are based on historical data that provides protection of the trap seal. Studor Air Admittance Valves are designed to allow the exact amount of air into the drainage system that is necessary to protect the trap seal. When the vent piping is sized in accordance with the manufacturer's installation instructions, the Studor AAV will protect the trap seal from any loss due to siphonage or self-siphonage.

Certain public sewer systems may exert a positive pressure on the connected building sewer. The positive pressure may be from a forced main, the proximity to the sewage treatment plant, overtaxed public sewer mains, high pressure sewer cleaning equipment, or a mountainous terrain. The pressure can be dissipated in the drainage system by having a vent extend to the outdoors.

When a sanitary drainage system connects to a private sewage disposal system, the design of the private sewage disposal system must also be taken into consideration. This is accomplished by either an open piped vent in the sanitary drainage system or by venting the private sewage disposal system.

The Studor AAVs conforming to ANSI/ASSE 1051 can be installed as the individual or branch vent.

When a horizontal branch connects to a drainage stack more than four (4) branch intervals below the top of the stack, a relief vent is required on the horizontal branch. The relief vent must be located between the air admittance valve and the branch connection to the stack. The relief vent must connect to the vent stack and may serve as the vent for other fixtures. The relief vent is designed to relieve the pressure resulting from the flow in the drainage stack to maintain a pressure differential of plus or minus one (1) inch of a water column.

Studor AAVs that comply with ANSI/ASSE 1050 can be used as the vent terminal for a vent stack. The maximum height of the drainage stack permitted to be vented by an air admittance valve is six (6) branch intervals.

The stack type air admittance valve can also be used as the vent terminal for a waste stack vent. The maximum height permitted for a waste stack vent having an air admittance valve is also six (6) branch intervals.

Acceptable Designs:

There are many designs that can utilize the Studor AAVs. Various layouts of acceptable designs are shown in diagrams on the following pages. The layouts are intended to show some of the acceptable designs, however, many other designs not depicted are also acceptable.

The size of the Studor AAV is determined based on the pipe size required for the vent. The vent pipe size is based on being a minimum of one half the size of the required drainage pipe. For example, a 4 inch circuit vented horizontal branch would have a 2 inch circuit vent with a 2 inch Studor Mini-Vent, Redi-Vent, Tec-Vent or Ultra-Vent as the vent terminal.

SIZING TABLE

Drain, Branch or Stack Size	Vent Size	Maximum DFUs on Branch		Maximum DFUs on Stack	Studor AAV
1¼"	1¼"	1	UP TO 6 BRANCH INTERVALS	1	Mini/Redi/Tec/Ultra
1½"	1¼" - 1½"	3		8	Mini/Redi/Tec/Ultra
2"	1¼" - 2"	6		24	Mini/Redi/Tec/Ultra
3"	1½" - 3"	20		72	Mini/Redi/Tec/Ultra
4"	2" - 4"	160		500	Mini/Redi/Tec/Ultra

The Mini-Vent, Redi-Vent, Tec-Vent and Ultra-Vent are rated up to a 2" vent and the Maxi-Vent is rated up to a 4" vent.

The Redi-Vent, Tec-Vent and Ultra-Vent cannot serve as the vent terminal for a vent stack.

INDIVIDUAL VENT

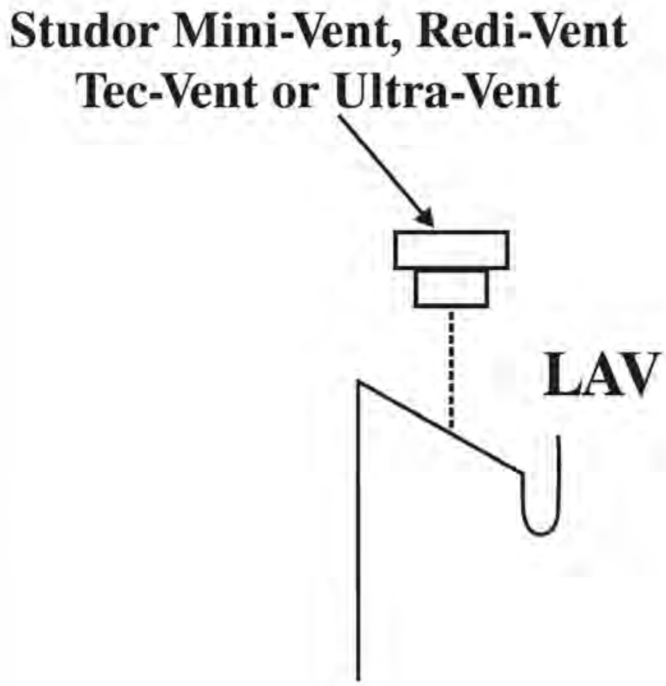


Figure 1

The simplest form of venting is an individual vent. A Studor Mini-Vent, Redi-Vent Tec-Vent or Ultra-Vent would serve as the vent protecting the fixture trap. The individual vent with a Studor AAV as the vent terminal is an effective method of venting island fixtures or fixtures located in a remote location.

The air admittance valve must be located a minimum of 4 inches above the weir of the trap. However, the valve may be located below the flood level rim of the fixture being vented.

COMMON VENT

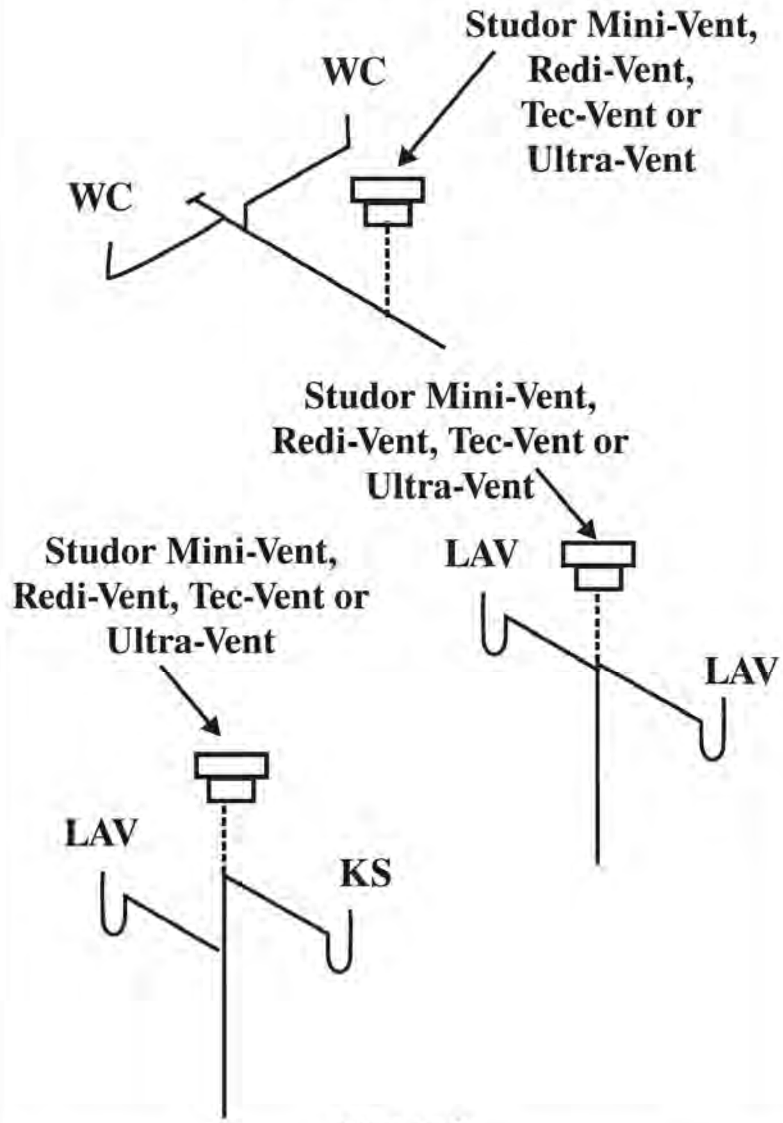


Figure 2

A common vent is similar to an individual vent. The vent serves two (2) or three (3) fixtures. The Studor Mini-Vent, Redi-Vent, Tec-Vent or Ultra-Vent can be located in the close proximity to the fixtures being vented.

WET VENT

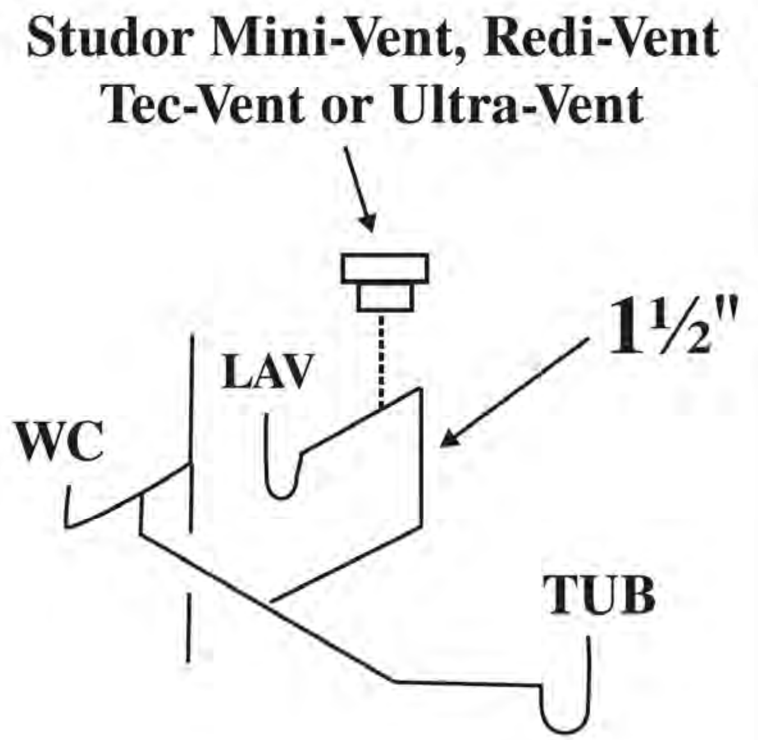
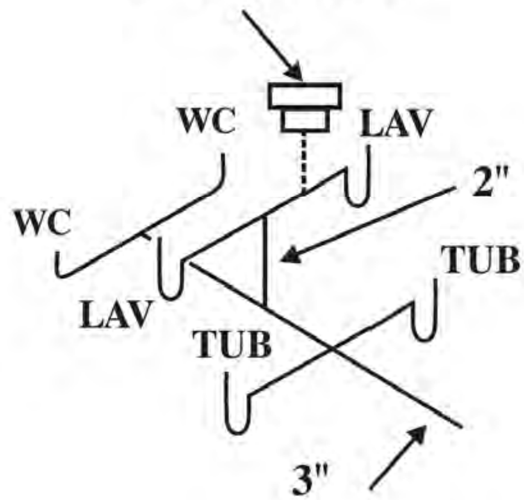


Figure 3

A wet vent is a single vent for one or two bathroom groups. There are different layouts for achieving the same venting concept.

A single bathroom group wet vent can terminate to a Studor Mini-Vent, Redi-Vent, Tec-Vent or Ultra-Vent.

Studor Mini-Vent, Tec-Vent or Ultra-Vent



Studor Mini-Vent, Tec-Vent or Ultra-Vent

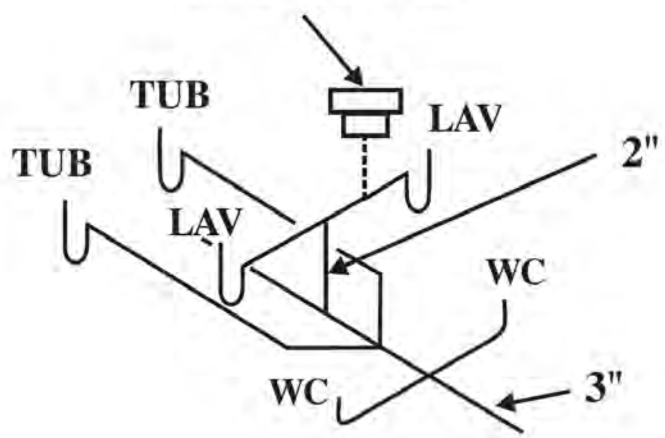


Figure 4

A double bathroom group, back-to-back, can be wet vented with a single Studor Mini-Vent, Tec-Vent or Ultra-Vent connecting as the vent.

CIRCUIT VENT

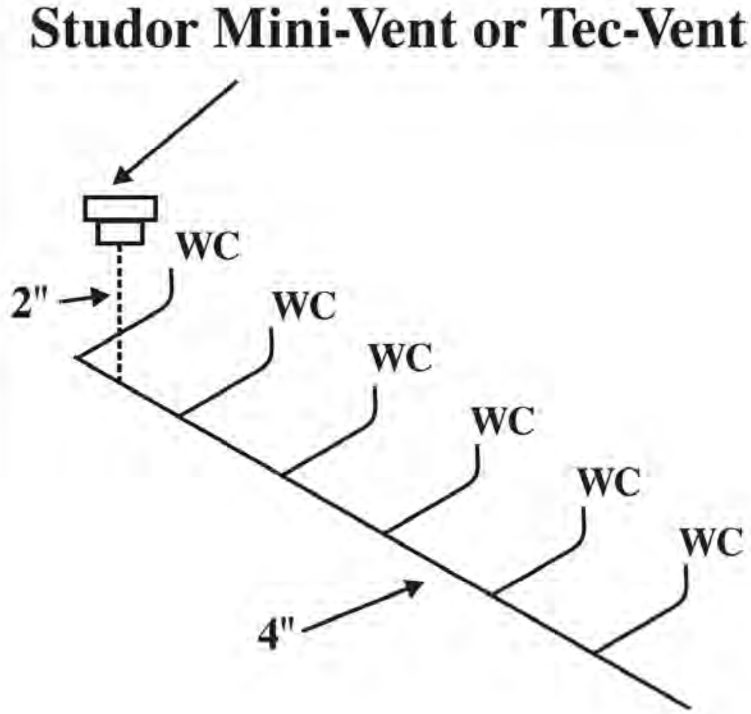


Figure 5

A single vent serves as the vent for three to eight fixtures. The Studor Mini-Vent or Tec-Vent serves as the circuit vent.

CIRCUIT VENT

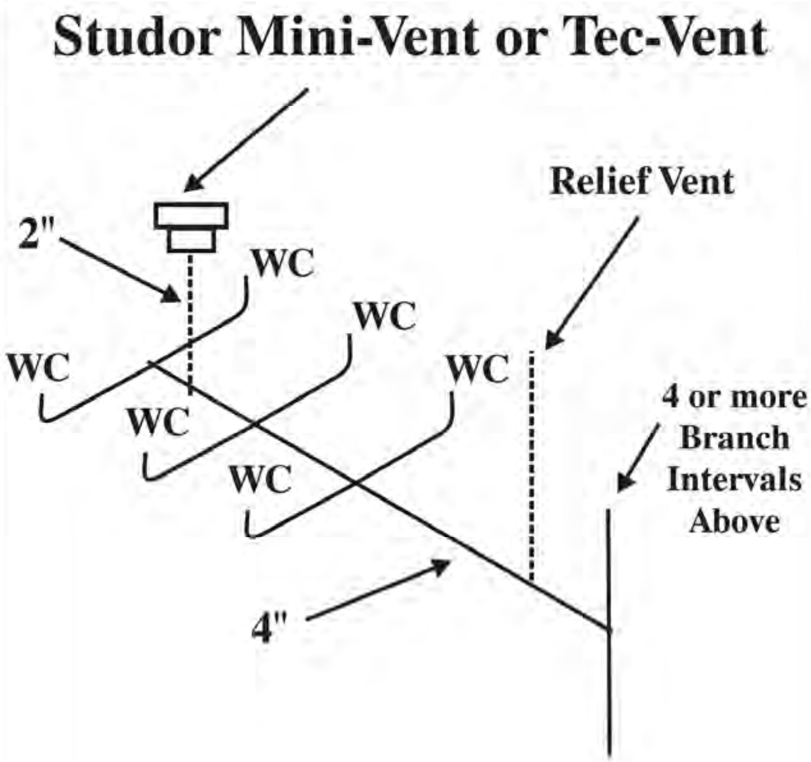


Figure 6

When the horizontal drainage branch connects to a stack having more than four branch intervals located above the branch, a relief vent is required. The relief vent must connect to the vent stack, stack vent, or extend to the outdoor air.

BRANCH VENT

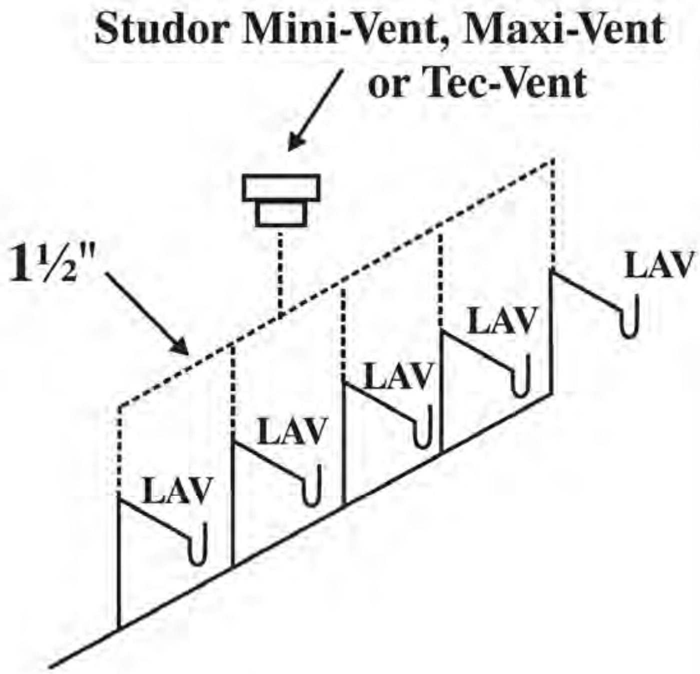


Figure 7

When various vents connect to a branch vent, a single Studor Mini-Vent, Maxi-Vent or Tec-Vent can serve as the vent for the branch.

BRANCH VENT

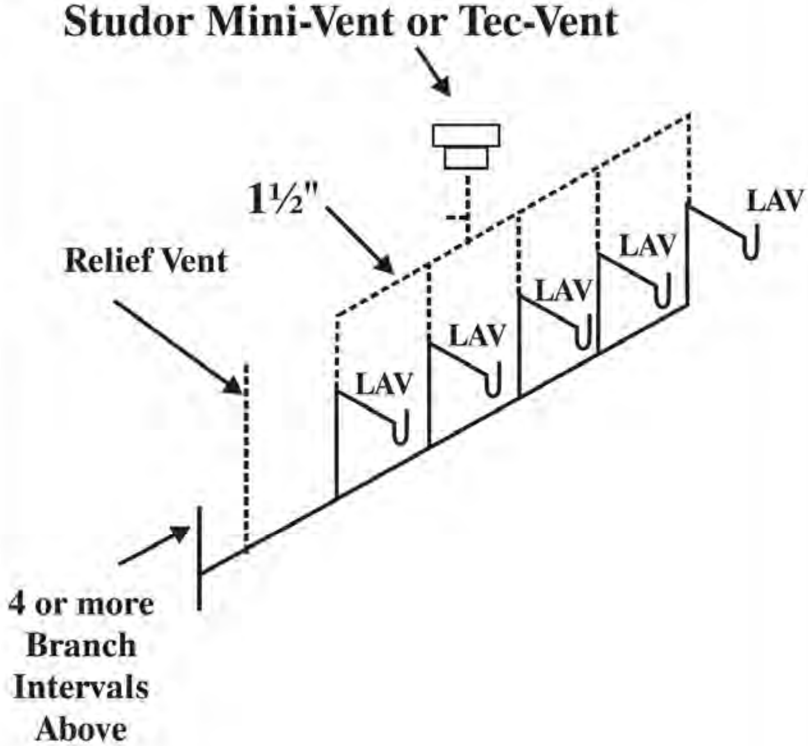


Figure 8

More than one Studor Mini-Vent or Tec-Vent can be installed within a horizontal branch to vent various fixtures. A relief vent is required when more than four (4) branch intervals are located above the branch connection.

VENT STACK - STACK VENT

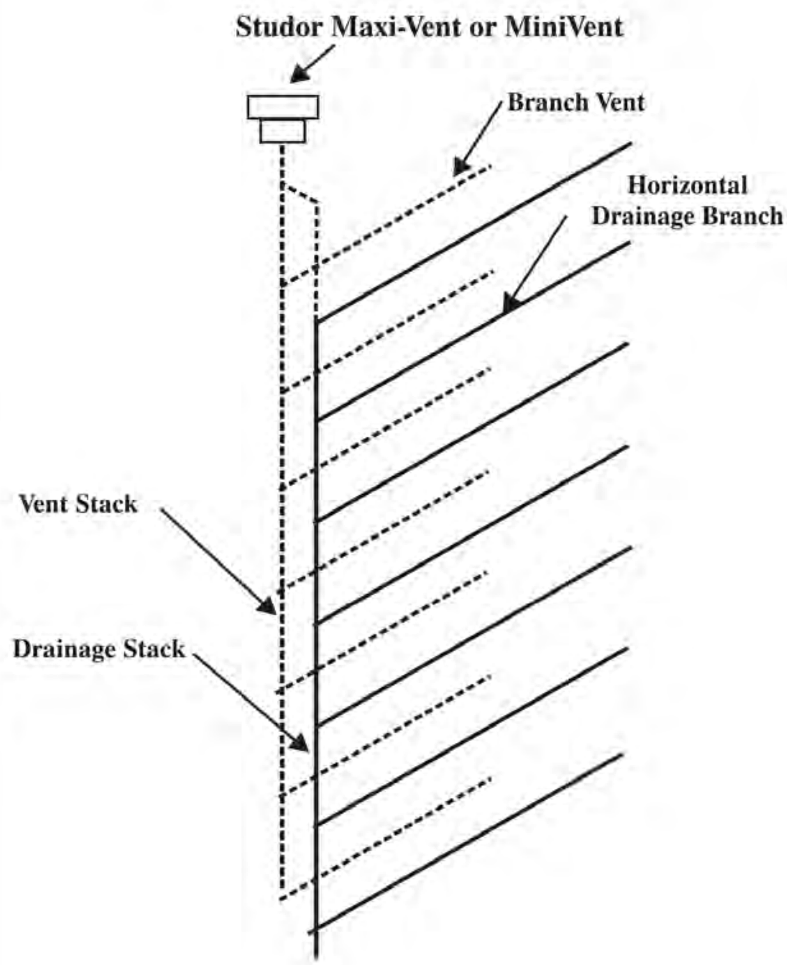


Figure 9

The stack type air admittance valve, Studor Maxi-Vent or Studor Mini-Vent, can serve as the vent for a vent stack or stack vent. The maximum height of the drainage stack that is vented with an air admittance valve is six branch intervals.

WASTE STACK VENT

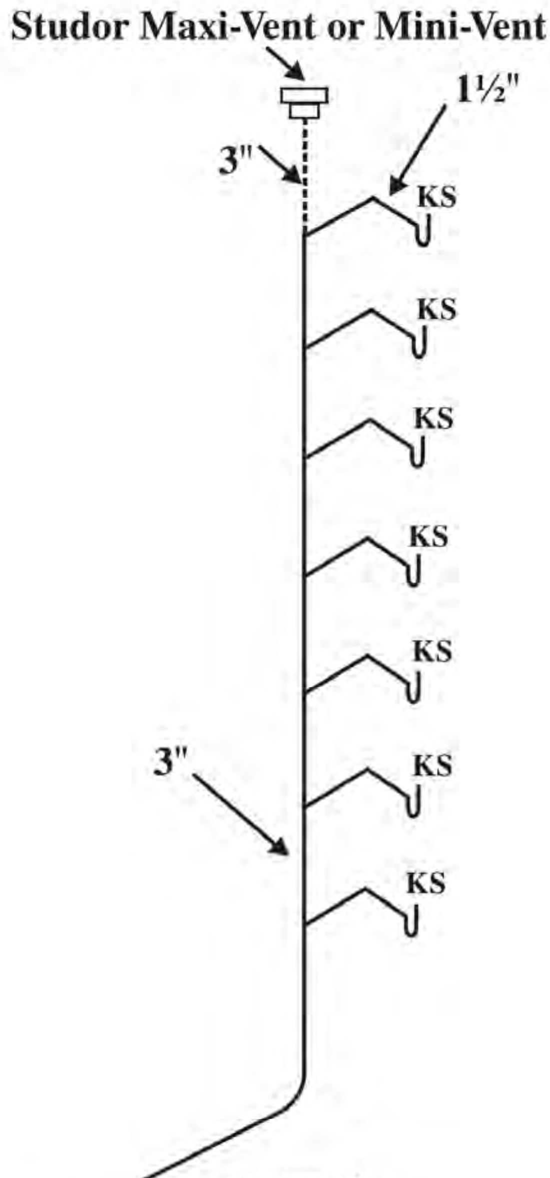


Figure 10

The Studor Maxi-Vent or Studor Mini-Vent can serve as the vent for a waste stack vent. The maximum height of the waste stack vent with an air admittance valve is six branch intervals.

WASHING MACHINE

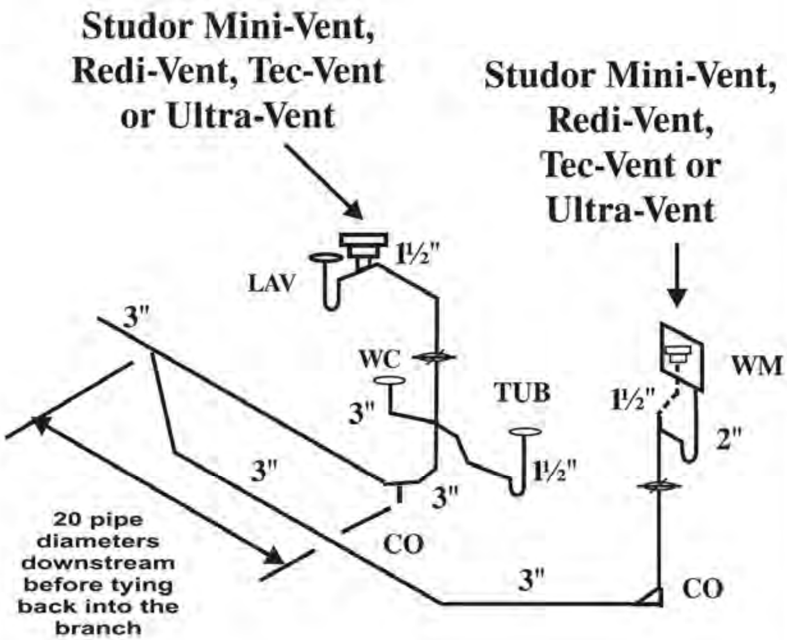
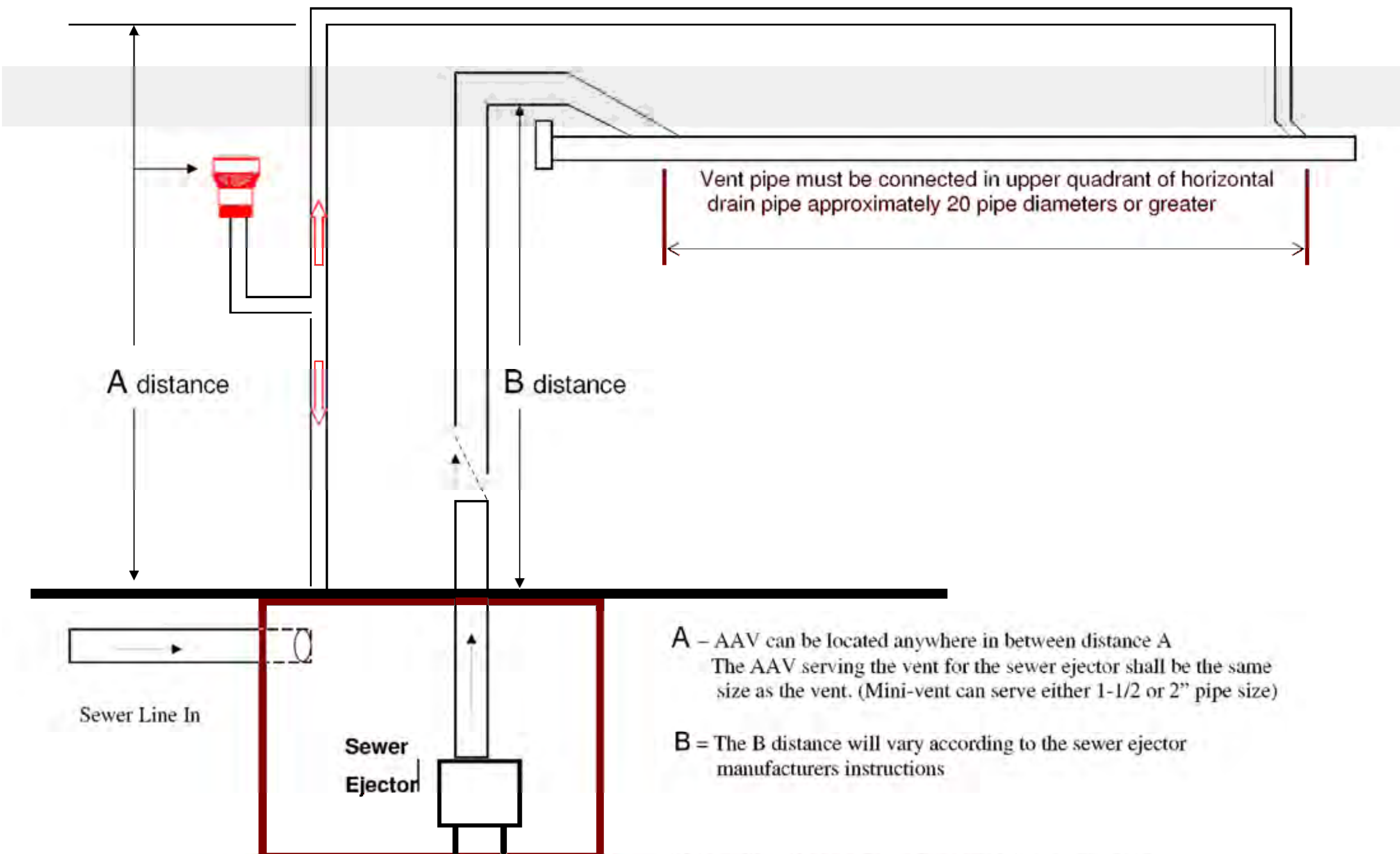


Figure 11



A – AAV can be located anywhere in between distance A
The AAV serving the vent for the sewer ejector shall be the same size as the vent. (Mini-vent can serve either 1-1/2 or 2" pipe size)

B = The B distance will vary according to the sewer ejector manufacturers instructions

Note: Air admittance valve must be accessible

Installation Requirements:

The Studor AAVs must be installed in accordance with the manufacturer's installation instructions. Failure to follow the instructions may result in the improper operation of the valve. In addition to the manufacturer's installation instructions, the following requirements shall apply.

1. In single fixture and branch applications the Studor AAV shall be located a minimum of four (4) inches above the weir of the fixture trap.

2. Each Studor AAV shall be accessible for replacement, if necessary.

3. Studor AAVs shall be located in a space that permits air to enter the valve. When located in a wall space the AAV shall be installed in the Studor Recess Box with louvered grill. Location of the Studor AAV in a vanity cabinet or sink cabinet is acceptable.

4. Studor AAVs shall be installed in the vertical upright position. The maximum offset from the vertical position shall not exceed fifteen (15) degrees.

5. The vent shall connect to the drain with a vertical connection to maintain an unblocked opening in the piping to the Studor AAV.

6. A minimum of one open pipe vent shall extend outdoors to the open air for every building plumbing drainage system. For drainage systems connecting to private sewage disposal systems, the vent should be located as close as possible to the connection between the building drain and building sewer.

7. The stack type Studor AAVs shall be installed six (6) inches above the highest flood level rim of the fixtures being vented in stack applications.

8. Studor AAVs installed in an attic area shall be located a minimum of six (6) inches above any ceiling insulation.

10. When a horizontal branch connects to a stack more than four (4) branch intervals from the top of the stack, a relief vent shall be provided. The relief vent shall be located between the connection of the branch to the stack and the first fixture connecting to the branch. The relief vent may also serve as a vent for a fixture. The relief vent shall connect to the vent stack, stack vent, or extend outdoors to the open air.

11. Studor AAVs shall be installed after the drainage system rough-in test at finish when fixtures are installed.

12. Apply pipe thread tape to valve thread before joining. Do not use pipe dope or tools to tighten.

Limitations of Use:

The following limitations of use shall apply to the Studor Mini-Vent, Redi-Vent, Ultra-Vent and Studor Maxi-Vent:

1. Where located in areas subject to extreme temperatures in excess of +150°F or -40°F the Studor Mini-Vent and Studor Maxi-Vent shall have the packaging container installed over the top of the valve as added protection.

2. The Studor AAVs shall not be installed as a vent for any sump sewer ejector unless approved by the administrative authority.

3. The Studor AAVs shall not be used to vent a special waste or chemical waste system unless approved by the administrative authority.

4. The Studor AAVs shall not be located in a supply or return plenum unless approved by the administrative authority.

5. The maximum height of drainage stack being vented by a stack type air admittance valve shall be 6 branch intervals.

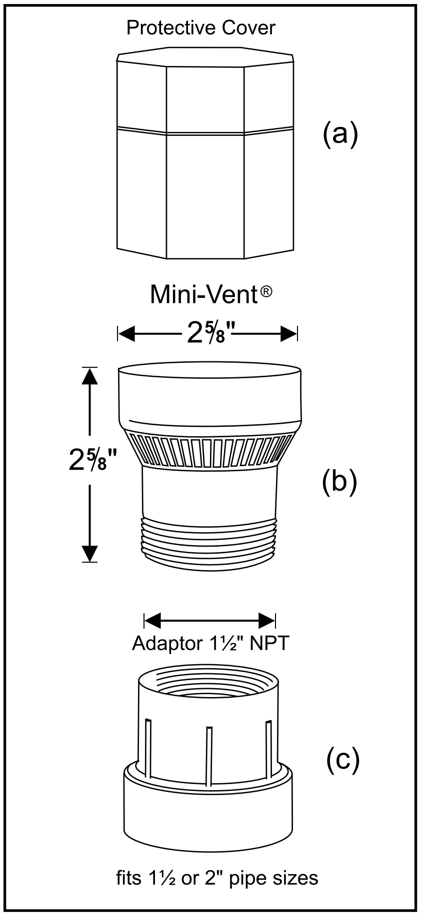
Summary:

Studor AAVs can be used as a single fixture, branch or stack vent. The code official may use this report as supporting documentation to approve the acceptance of the Studor AAVs.

STUDOR IPS CORPORATION

InVENTive TECHNOLOGY®

Specification Sheet / Mini-Vent®



Manufacturer: Studor®, Inc.
Item #: 20301 (PVC Connector)
20300 (ABS Connector)

Model: Mini-Vent
Connection Size: 1½"-2"

General:

An air admittance valve shall be acceptable as a vent termination for any individual vent, common vent, circuit vent, loop vent, island fixture vent, vent stack or stack vent that is provided to prevent siphonage of a fixture trap. An air admittance valve can be used as an alternative to extending a vent through the roof (or sidewall) to the open atmosphere.

Location:

A. The Mini-Vent® should be located a minimum of 4" above the weir of the fixture trap for single fixture and branch venting and 6" above the flood level of the highest fixture for stack venting.
B. Each valve should be installed in an accessible location.

Installation:

A. The valve should be connected to the piping in accordance with the manufacturer's installation instructions.
B. The valve should be installed in the vertical, upright position after rough-in and pressure testing of the DWV system.
C. A minimum of one vent shall extend to the open atmosphere for every building drainage system.
D. The valve should not be installed as a vent terminal for any special(chemical) waste system or in supply and return air plenums.
E. The valve may be installed on sewer ejectors, if installed according to engineer design and prior local code approval.

Features:

A. Screening on the inside and outside of the valve to protect the sealing membrane from insects and debris.
B. Protective cover for the air intake and additional insulation against extreme temperatures.
C. Ability to divert condensation away from the sealing membrane.
D. Lifetime Warranty.

Materials:

(A) Polystyrene
(B) ABS (acrylonitrile butadiene styrene) valve with elastromeric membrane
(C) ABS or PVC Adaptor

Performance Standards:

- ANSI/ASSE 1051 (revised 2002) single fixture and Branch type AAVs
- ASSE 1050 (1991) Stack Type AAVs
- NSF Standard 14 (Plastic Components)

Code Approvals:

- International Plumbing Code (IPC) 2003 Edition
- Southern Building Code Council International (SBCCI) 1994 Edition
- Building Official Code Administration (BOCA) 1993 Edition
- International Residential Code (IRC) 2003 Edition
- Uniform Plumbing Code (UPC) Section 301.2 Alternative Materials and Methods 2003 Edition

Listings:

- ASSE Seal of Approval
- National Evaluation Services (NES-592)
- NSF International (NSF Standard 14)
- NSF International (ANSI/ASSE Performance Standard 1051 and ASSE 1050)
- IAMPO Classified Marking, file No. C-3803
- Warnock Hersey (ITS - Intertek Testing Services)

Sizing Chart

Horizontal Branch Size	Max DFUs
1½"	3
2"	6
3"	20
4"	160
Stack Size	**Max DFUs**
1½"	8
2"	24

MAXI-FILTRA

The following specification text has been prepared to assist design professionals in the preparation of a specification incorporating MAXI-FILTRA carbon filter by Studor, Inc. Utilize these paragraphs to insert text into Specification Section 15150 - Sanitary Waste and Vent Piping, or similarly titled section governing this work.

Editing notes to assist in the proper editing of the specifications are included as blue text. Delete these notes from the final specification.

Websites listed in the editing notes are hypertext links; while connected to the Internet, simply click on the underlined text to go to the applicable web page.

For assistance on the use of the products in this section, contact Studor, Inc. by calling 800-447-4721, by email at info@studor.com, or visit their website at www.studor.com.

PART 1 - GENERAL

If shop drawings, product data, or samples are desired, insert the following under "Submittals." Edit to include only those submittals actually required.

1.X SUBMITTALS

- A. Shop Drawings: Indicate filter locations and filter sizes.
- B. Product Data: Include product description, required maintenance, and installation instructions.
- C. Samples: Full size sample of filter.

Insert the following under "Warranties."

1.X WARRANTIES

- A. Provide manufacturer's limited lifetime warranty providing coverage for replacement of defective filter.

PART 2 - PRODUCTS

Insert the following under "Materials."

2.X MATERIALS

- A. Carbon Filter:
  1. Source: MAXI-FILTRA by Studor, Inc.
  2. Components:
     - a. ABS body.
     - b. Active Charcoal Filter replaceable cartridge
     - c. Rubber connector.
  3. Features:
     - a. UV inhibitor in resin compounds for exposure to sunlight.

Edit the following to suit project requirements.

4. Connection size: [3 inches.] [4 inches.] [As indicated on Drawings.]

PART 3 - EXECUTION

Insert the following under "Installation."

3.X INSTALLATION OF CARBON FILTER

- A. Install filter after drainage and waste system has been roughed in and tested.
- B. Install valves in accessible locations to allow for filter cartridge replacement.
- C. Connect valves to piping in accordance with manufacturer's instructions.
- D. Do not install valves on chemical waste systems or in supply and return air plenums.
- E. For Outdoor Installation Only.

For information about the Alternative Technology Advisory Committee, instructions for filling out this application form and a list of submittal requirements please see our web site at www.portlandonline.com/bds/atac

Applicant Information:

Name: Tad Everhart
Email Address: tad.everhart@comcast.net
Address: 539 SE 59th Court
City: Portland **State: Oregon** **Zip Code: 97215-1969**
Phone No.: (503) 239-8961

Project Information:

This application involves (check one):

XX☐ A technology not associated with a specific project

☐ **~~A specific project currently under review~~**

Project Address:

Tax Account number:

Building Permit No.:

LU Case No (if applicable):

☐ **Other (specify):**

I. Overview of Technology

A. Proposed Technology: Please describe the material/product/construction method you would like to have reviewed by the committee

Air Admittance Valves manufactured by Studor, Inc. ("AAV"). Specific models are the Maxi-Vent, Mini-Vent, Ultra-Vent, Redi-Vent, and Tec-Vent.

There is a short video describing how an AAV works at http://www.ipscorp.com/studor/technical/video
I have a clear demonstration Studor Mini-Vent that I will bring to the hearing.

B. Application of Technology: Please describe the specific application of the technology. How, when and where will this technology be used?

I wish to install the AAV in my family's home in Portland, Oregon as soon as the City of Portland permits as part of retrofitting our home to meet the stringent Passive House energy-efficiency standard.

AAVs in lieu of one or more through-roof vent stacks ("vent stacks") is a key factor in the retrofit or new construction of any building to the Passive Home standard due to the Passive House air-tightness standard. Vent stacks cause penetration of the building envelope and increase the likelihood of air leaks.

Although I could try to seal these penetrations, there is a risk I would not succeed completely. That is why people who design and build Passive Houses design and build them without unnecessary penetrations (as well as saving time, materials, and labor needed to seal the unnecessary penetrations).

The City of Portland has endorsed high-performance buildings. All buildings can incorporate AAVs to reduce air leakage.

Further, AAVs reduce the need for insulating vent stacks and the waste lines to which they are connected, minimize environmental impacts, reduce construction materials and waste, reduce risk to construction workers installing and testing vent stacks, and reduce construction costs.

Each plumbing fixture has to have a wet seal to prevent sewer gas from entering the house. A wet seal is formed by the water standing in the "P" trap under a sink, toilet, shower or other plumbing fixture. The flow of water/waste creates negative pressure which is balanced by the air flowing into the system through the the vent stack so that the wet seal remains in place. AAVs provide equal or superior air admittance.

A secondary benefit of a roof vent is to provide an escape for positive pressure. Positive pressure is not generated by the house but may occur as a result of pressure in the City sewer system. I wish to keep one vent to release positive pressure since the Studor AAV does not relieve positive pressure. I could retain one of my existing vent stacks; however, I prefer to have my state-licensed plumber design and connect a new horizontal loop type vent to discharge outside the foundation at an appropriate distance from any opening door or window.

I would have my plumber install the AAVs according to the City's conditions and plumbing permit as well as the manufacturer's recommendations (see http://www.ipscorp.com/studor/technical/specsheets and http://www.ipscorp.com/pdf/studor/Installation.pdf I will bring a Studor Mini-Vent to the hearing to show how it is installed.

If the City of Portland approves the AAV, I anticipate approximately 15 installations in 2009 and the number of installations doubling each successive year. Any house seeking High Performance or Passive Home Designation would use this technology

C. Code Conflicts: Please describe any known building code issues related to this technology.

The AAV is allowed by a number of national and international building codes. Please see the Studor brochure for a list as well as the following link for relevant sections of those codes: http://www.ipscorp.com/studor/reference/codes

The AAV is allowed by Oregon Building Code Alternative Method Ruling No. 07-1 ("AMR" - see attached copy). However, the AMR is conditional, and the conditions negate the AAV's advantages that applicant needs to build an energy-efficient home. The AMR prohibits more than 3 AAVs per structure, and it prohibits use of an AAV to vent more than one fixture.

The plumbing code requires that the cross sectional area of the vents equal or exceed the cross sectional area of the sewer line when it exits the building. Most homes have a 3" sanitary sewer line. A typical 2 ½ bath house would then have two (2) 2" through-roof vent stack and one (1) 1 ½" through-roof vent stack. The cross sectional area of these vent stacks is equal or greater that the cross sectional area of the 3" sanitary sewer line. Plumbers typically install these vent stacks over the bathrooms or kitchen. Thus, the sewer (waste) lines extend vertically through the building envelope (either directly from the conditioned area through the roof above the conditioned area or through the ceiling of the conditioned area which is below an unconditioned attic and then through the roof). Three (3) vent stacks typically serve a house with 2 ½" baths (3 toilets, 3-5 sinks, 1 laundry connection, and two tub/showers. Our house has three full bathrooms, one kitchen sink, one laundry tub, one washing machine connection, and 3 vent stacks.

The AMR will allow me to vent only one bathroom with AAVs.

II. Sustainability

<u>A. Sustainable Elements</u>: Describe how this alternative substantially reduces the environmental impact on the planet over similar technologies currently allowed by the code? ***Please attach any documentation that supports your answer.***

In Portland's climate, energy-efficient homes are virtually air-tight. Otherwise, "random" or "accidental" ventilation through the "building envelope" (ceiling, walls, and floor) causes uncontrolled heat loss in the heating season and heat gain in the cooling season. For this reason, many leading energy-efficient building designers and building scientists recommend air-tight buildings with balanced, mechanical ventilation. Most energy-efficiency building standards recommended by local and state governments and the United States include an air-tightness standard.

Local examples are the Northwest EnergyStar standard of no more than 7 Air Changes per hour at 50 Pascals (50 Pa) depressurization by a blower door ("ACH"). The Oregon High Performance Home standard is 5 ACH. The Passive House standard is 0.6 ACH.

The Passive House standard is the highest energy-efficiency standard adopted by a significant number of building designers and contractors. The Passive House standard is cost-effective and easily implemented with current building assemblies and components.

Buildings that meet the Passive House standard are so air-tight and well insulated that "internal" heat from occupants, typical residential electrical appliances, solar radiation, and residential activities (particularly cooking and bathing) meet most of the heating load and the annual heat demand.

Thus, the Passive House standard allows Portland residents to live and work in buildings that consume so little energy that it is feasible today for renewable energy sources to supply all of the building's operating energy.

However, this "passive" strategy depends on the most energy-efficient building envelope. Internal heat supply is a small fraction of the heat an active heating system like a furnace or heat pump supplies. Therefore, a Passive House cannot waste heat lost through unnecessary penetrations. Nor can it heat or cool ambient air that leaks into the building. (Note that in the summer, a Passive House depends on an air-tight building envelope preventing hot ambient air from infiltrating the building and increasing cooling loads which we can usually meet using nighttime flushing with relatively cool air).

Briefly stated, I wish to retrofit our home's building envelope so that it is virtually air-tight. I hope we will meet or exceed the Passive House standard of no more than 0.6 ACH.

The principal benefit (but not the only benefit) of the AAV for applicant is to reduce or eliminate penetrations in the air-tightness barrier provided by the ceiling. Currently, applicant's house has at least 4 plumbing stack penetrations of the ceiling for vents serving the 3 bathrooms, 1 kitchen, and 1 laundry hookup (which terminate in 3 plumbing vent stacks penetrating our roof).

Another benefit of the AAV is that it reduces the need for insulation. In a low-energy building such as a Passive House, all penetrations in the envelope that allow ambient air inside the envelope must be insulated to reduce heat transfer. Thus, plumbing stacks that bring ambient air within the envelope require the Passive House builder to insulate the waste lines within the building to reduce conductivity.

Additionally, we wish to replace our composition roofing with a more sustainable metal roof. This metal roof will be more sustainable for a number of reasons that are well-established and recognized by sustainable building programs. The white or light-colored metal roof will also provide superior thermal performance by reflecting summer solar radiation and minimizing thermal mass that stores summer radiation. Additionally, we hope that the rainwater that we harvest for irrigation will be cleaner running off a metal roof. Using AAVs will reduce or eliminate penetrations, reduce building material, and eliminate risk to the persons performing the construction.

Finally, AAVs provide other environmental benefits summarized in the attached "Venting and the LEED Protocol" although not all of these benefits are present in applicant's retrofit. Chief among these benefits is a substantial reduction in vent piping which is typically ABS plastic. If I am allowed to install AAVs below the ceiling to replace my open vent stacks, my plumber should be able to remove approximately 50 feet of 1.5" and 2" ABS and donate it for reuse. Studor lists other benefits of using AAVs at http://www.ipscorp.com/studor/benefits

B. Reason for Alternative: Describe why this alternative is desired?

Radically reducing building operating energy consumption is widely accepted by the City of Portland and its citizens as desirable for a number of reasons including but not limited to:

1. Increasing national security by reducing dependence on imported fossil fuels
2. Reducing building operating costs by reducing energy use
3. Reducing environmental harm caused by extracting and burning fossil fuels
4. Speeding implementation of on-site renewable energy systems that can supply all of the energy required by low-energy buildings
5. Increasing building comfort and indoor air quality

I wish to install AAVs in my home as part of a Passive House retrofit to meet either the retrofit standard or the new Passive House standard (both standards include the same air-tightness standard). Several other persons would like to install the AAVs in Passive Houses in Portland.

Studor, Inc. is employing all legal means to secure a new alternative method ruling or amendment of the existing AMR to allow practical use of AAVs in Oregon. However, it is unlikely Studor will achieve this in time for my retrofit which I hope to begin in August and complete in September. In fact, Studor's earliest opportunity to meet with the Oregon Building Code committee with jurisdiction is October.

C. Comparison to Other Technologies: How does this technology provide equivalent life safety and/or fire protection than the current technologies allowed by the code?

AAVs are a current technology allowed by many national and international model building codes including the the Uniform Plumbing Code that is the basis for the Oregon Plumbing Code and the International Residential Code which is the basis for the Oregon Residential Specialty Code. Please see the list of code approvals in the Studor brochure.

AAVs meet the highest performance standards and are listed by several well-recognized listing labs. Studor has made several improvements to its AAVs' design, construction, and materials. Please note that the Studor AAV does not incorporate a spring or other mechanical device which can degrade over time.

As the AMR acknowledges, 32 states allow AAVs, and the HUD code for manufactured houses allows AAVs. For a list of states with full or partial approval of AAVs, see http://www.ipscorp.com/studor/reference/approvals

To the extent that the AAVs makes energy-efficient buildings possible, it increases national security and decreases environmental harm---providing greater life safety and fire protection than the alternative of through-roof plumbing vent stacks.

III. Supporting Documentation

<u>A. Testing Data</u>: Describe any testing that has been performed on this technology to show how it may be able to meet code requirements. ***Please attach all available testing data.***

Please see the list of testing in in the Studor AAV brochure as well as the AMR. Additional testing information is available at http://www.ipscorp.com/studor/reference/prod_listings and http://www.ipscorp.com/studor/reference/prod_standards

My transmitting email contains electronic copies of additional supporting documentation as well as links to additional supporting documentation.

<u>B. History of Use:</u> Describe all known instances where this technology has been applied to a constructed building, including approximate date, location and building type. ***Please attach any documentation that supports your answer.***

According to Studor's brochure and the AMR, there are at least 2.5 million AAVs in use throughout the world---evidence of widespread adoption since they were invented in the 1970s in Sweden. Applicant is unaware of any AAVs being used in Oregon except with kitchen sinks in islands where vertical wet vents are not practical.

Studor maintains a list of significant buildings and projects employing AAVs (as well as building designer/construction contractor/owner endorsements) at http://www.ipscorp.com/studor/reference/projects

<u>Responsibility Statement:</u>

As the applicant submitting this application I am responsible for the accuracy of the information submitted. I have submitted all the relevant information available about the technology I am requesting the Alternative Technology Advisory Committee to review. I believe the information submitted to be a compete and accurate representation of the proposed technology and I am aware that any omission (either voluntary of accidental) could cause the application to be denied. I understand that more information may be requested before the committee can make a recommendation on my application.

I understand that the recommendation from the committee is not binding. In addition a favorable recommendation from the committee is not a guarantee that the Administrative Appeals Board will approve a subsequent building code appeal. The City of Portland and the committee members have no implied or expressed liability associated with the conclusions of the Alternative Technology Advisory Committee. By my signature, I indicate my understanding and agreement to the Responsibility Statement.

Applicant's signature: **Date:**

For Office Use Only:

Received By: Date Received: Receipt No.: