



Wendy Lathrop is licensed as a Professional Land Surveyor in NJ, PA, DE, and MD, and has been involved since 1974 in surveying projects ranging from construction to boundary to environmental land use disputes. She is a Professional Planner in NJ, and a Certified Floodplain Manager through ASFPM.

Smart Vent: Safety and Service

It's always pleasing to discover something new and impressive about someone you think you know well. When it's a company you've known for a long time, it's an extra pleasure. Smart Vent has been present at many of the floodplain management events I've attended over the years, but only recently have I discovered more about their story of creative solutions and community support.

The company itself is a subsidiary of Smart Product Innovations, along with two other groups, Clean Cut and ECO-Auger. Clean Cut produces a paper-cutting device that operates with the wave of a hand through LED sensors to first dispense and then cut a roll of paper to the desired length. While originally designed to provide a touch-free sanitary means of dispensing paper towels, other applications are easily imagined. Meanwhile, ECO-Auger has made news and won awards for its hydro-kinetic ability to create a constant energy output from the movement of river or ocean currents. Featured in the 2010 *Popular Science* Invention Awards issue, the bi-directional water auger also won the 2009 ConocoPhillips Energy Prize. A joint initiative with Penn State University, this award is made for new ideas and original actionable solutions to improve how we develop and use energy.

With this proud background of simple yet trend-setting technology, it is little wonder that the concept for a buoyancy-driven foundation flood opening would join the lineup of inventions. The idea for the first Smart Vent product resulted from an architectural designer's desire to find a structural answer to floodproofing buildings that would meet various local, national, and international building



Smart Vent's traveling tank illustrates how buoyancy of the stainless steel plate opens the vent automatically. Full demonstrations (live and on YouTube) show the plate switching directions when water begins flowing out of the structure as exterior floodwaters recede.

codes for structural safety, FEMA regulations for mitigating structural damage in floodplains (see *44 CFR 60.3*), and National Flood Insurance Program (NFIP) requirements for insurance rating. Upon patenting the first model to address this range of concerns, Smart Vent was born in 1998.

Federal floodplain management regulations require flood openings in the walls of building foundations and enclosures to allow for automatic entry and exit of floodwaters (*44CFR 60.3(c)5*). Any device that requires human action to open it—such as a window, louver, door, garage door, or removable vent cover-

ing—does not adequately protect a building from hydrostatic pressure that can implode or deform a structure or even move it from its foundation. Buildings without adequate or appropriate flood openings are structurally non-compliant and may face local regulatory repercussions, including expensive and time consuming retrofitting requirements or denial of Certificates of Occupancy.

This was just one of the factors fueling the creation of the first Smart Vent. Improperly flood vented structures are also assessed significantly higher flood insurance premiums (for both the structure and its contents) than similar



Tom Little, VP of Smart Vent Products (left) and Mike Graham, President of Smart Vent Products (right) demonstrate installation. Units are sized to fit easily into standard masonry or frame construction.

buildings that have appropriate openings. Improper flood venting or insufficient flood opening area can change which floor of the building is considered the lowest floor for insurance rating purposes. As a rough rule of thumb, insurance rates for both building policies and contents policies for Post-FIRM structures with the lowest floor situated one foot *above* Base Flood Elevation are about half the cost of policies for structures with lowest floor just at Base Flood Elevation, while rates for buildings with lowest floor one foot *below* Base Flood Elevation are about double the cost for those with the lowest floor at Base Flood Elevation.

“Wet floodproofing” approaches are required for post-FIRM residential buildings but there is a second option for non-residential construction called “dry floodproofing”, which attempts to seal structures to make them watertight or substantially impermeable. However, “dry floodproofing” cannot extend more than a total of three feet above lowest adjacent grade without causing serious damage from the weight of floodwaters against building walls. Compounding this limitation is the fact that “dry floodproofing” should also extend to at least one foot above Base Flood Elevation to provide the best protection (see FEMA’s *Technical Bulletin 3-93: Non-Residential Floodproofing—Requirements and Certification*). Thus, this approach is not suitable for many buildings.

“Wet floodproofing” (use of compliant flood openings) and elevation of structures are the preferred methods for residential buildings, pursuing the least obstruction

to floodwaters in order to lower the risk of structural damage during a flood. Both engineered and non-engineered approaches are acceptable to meet regulatory building requirements outlined in *44CFR 60.3(c)5* for achieving hydrostatic equalization. The distinction between them is in the net opening in relation to the area each is rated to protect, but this is not always easy to detect in the field. Non-engineered openings must physically provide one square inch of net open area for each square foot of enclosed area. Engineered openings are designed and certified as meeting the same performance requirements as non-engineered openings, even though the physical opening may differ from the standard ratio of opening to enclosure. This can be accomplished in

two ways. For unique openings designed for a specific project, the responsible registered design professional must provide a Floodproofing Certificate. Standardized engineered openings (such as Smart Vent) must be performance tested and then certified by International Code Council-Evaluation Services (ICC-ES) for a determined square footage of coverage per model. (See FEMA’s *Technical Bulletin 1: Openings in Foundation Walls and Walls of Enclosures*, 2008.)

The general public doesn’t like the idea of water, cold air, or snakes and raccoons coming into homes through flood openings and therefore often will cover or block them, completely foiling the purpose of those vents. Smart Vent’s engineered openings are designed to overcome these objections. The sides of the stainless steel flood doors in each unit are notched to allow floodwaters to easily and automatically lift and unlatch them from their otherwise closed position. In the open floating position, water passes freely through the unobstructed opening, equalizing pressure on both sides of the wall. In addition to providing certified flood protection, internal louvers on all dual function Smart Vent models automatically open and close with temperature changes that expand and contract the metal fittings.

Engineered flood openings can be confusing to surveyors who must identify and report them in Section A of the Elevation Certificate. Compounding the problem is the common presence of vents meant for air circulation, but these do not serve as proper flood openings unless



Remember that the bottom of the flood opening (where water will enter, not the bottom of the frame) must be within 12 inches of adjacent grade to comply with regulatory and insurance requirements.

they are permanently uncovered and broken to remain in the open position.

To help surveyors in identifying its engineered openings and the appropriate opening area to report on the Elevation Certificate, Smart Vent affixes a label to every unit identifying the company, the model number, and the number of square feet for which the model is certified to provide proper venting. Such product identification also meets requirements of the ICC-ES for any building product that it has evaluated and certified. Since the physical opening is smaller than the one inch per square foot of enclosure ratio required for the lowest flood insurance premiums and regulatory compliance, surveyors should note the area for which the model is rated, adding words to identify this as rated area rather than physical open area, annotating Section A to direct readers to look for Section D comments.

Smart Vent has submitted each of its models for testing and certification by ICC-ES (a national nonprofit company that evaluates and provides reports on the technical aspects of building products, components, methods, and materials) to support the company's internal testing of flood venting coverage, and maintains this certification as part of its commitment to quality assurance and public safety. To date, no other engineered flood opening has ever

been tested and certified by ICC-ES. Smart Vent firmly believes that all flood openings should be tested and certified to protect those relying on them for protection of their buildings.

Instructions for the Elevation Certificate direct the surveyor to attach certification forms for engineered open-

“Any device that requires human action to open it—such as a window, louver, door, garage door, or removable vent covering—does not adequately protect a building from hydrostatic pressure that can implode or deform a structure or even move it from its foundation.”


ings, and having the Smart Vent model number simplifies the process of finding the report on line (www.icc-es.org). Minimizing confrontations with insurance agents and building officials regarding physical and rated net openings is one benefit of having documentation located directly on Smart Vent units; avoiding the need to take on liability for assumptions or guesstimates is another.

Based in Pitman, New Jersey, Smart Vent has about 25 employees, all of them either currently Certified Floodplain Managers (CFM) through

the Association of State Floodplain Managers (ASFPM) or required to achieve that status within six months of hire. CFM status requires an ongoing commitment to continuing education after successfully passing an examination covering general and specific floodplain management approaches, NFIP

regulations, floodplain mapping, flood insurance, and flood hazard mitigation. This background enables Smart Vent's staff to interact knowledgeably with everyone from local building code officials and floodplain managers to homeowners, architects, builders and surveyors. They welcome questions and work hard to inform the public about proper flood openings. The company's approach to sales is education for users and identifiers of flood vents, offering informative publications on its website and at its trade show appearances, presenting short educational sessions about identification of engineered flood openings and reporting on Elevation Certificates, and actively participating in professional floodplain management groups at the state and national levels.

Smart Vent's commitment doesn't stop there. In striving for responsible corporate citizenship, the company has donated its foundation vents to flood disaster victims ranging from Habitat for Humanity groups across the country to Extreme Makeover Home Edition in New Orleans and a church in Theriot, Louisiana.

For its technological efforts, Smart Vent has earned “Most Valuable Product Award” from *Building Products Magazine* (2003), Spot No. 49 on the annual list of “Top 100 Products” (*Building Products, Builder, and Custom Home* magazines, 2004) with particular note of a model with automatic louvers that adjust to changes in temperature and sensors that respond to rising water levels, and a “Most Innovative Product” award from *World of Concrete* conference attendees and magazine readers in 2007. 



A label on every Smart Vent identifies the ICC-ES report number (ESR), the model number, and the area of certified coverage.