PESPWire

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Pest Prevention: Steps Designers Can Take

Integrated pest management (IPM) design strategies can reduce structural damage and unsanitary conditions, and improve our community's health.

There's a tremendous variety of treatment options and pest management solutions for bed bugs, rats, cockroaches and other structural pests. One could argue there is an art to structural pest management when learning about the creative solutions involved in the science of controlling pests in a building.

Even at the turn of the 20th Century, architects, engineers, and city planners were creating design trends like City Beautiful that, along with improving aesthetics and livability, addressed sanitation, which helped reduce pest pressure. Today, the green building movement is continuing that tradition by influencing pest management through design.

Although many green buildings rating systems include pest management as an optional factor, integrated pest management (IPM) and green pest management are key factors being considered by architects, developers, and professional builders' associations.

Some states, cities and local governments are embracing the green building movement – over 220 jurisdictions have green building mandates. In 2012, the City of San Francisco's IPM program released the *Pest Prevention by Design Guidelines for Buildings and Landscapes*. Some local governments offer substantial tax incentives to developers that build properties in accordance with specific standards.

Certified green building professionals also play a key role in green development. These professionals are credentialed and well prepared to implement holistic IPM programs.

Brent Ehrlich's article for BuildingGreen magazine highlights the intersection between building design and pest management. We hope you find the following excerpt from Pest Prevention: Steps Designers Can Take to be helpful and informative:

Design Hints from the Ground Up

The Pest Prevention by Design guide provides specific IPM design strategies covering the entire building. Along with detailed explanations of where to seal and why, the guide looks at other simple steps design professionals can take to keep pests out.

BuildingGreen

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Have Questions on IPM?

Contact EPA's Center for IPM!
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Foundations and Slabs

Without careful detailing, foundations can provide entry points for subterranean termites, rats, cockroaches, and other pests. You have to go beyond code requirements for drainage and ventilation to keep them out.

- Keep the upper 4" of the slab exposed and allow a minimum 18" clearance between beams and joists and ground to guard against pests (or 36" where termites are active), and to make it easier to inspect.
- Minimize cracks in concrete of more than a credit card thickness (0.8 mm), since 83% of subterranean termites come in through expansion joints in concrete slabs. That includes concrete joints and expansion joints when possible, though minimizing these can conflict with engineering requirements. Protect joints and cracks with mesh or sand/stone barriers.
- Use termite shields or barriers.
- To keep rats from burrowing under the foundation, use a vertical curtain wall with an L-shaped flange along the foundation 2' below the surface. This can be made from iron, concrete, brick, or other rodent- and rot-resistant material.
- Where utilities come through slabs, seal gaps using epoxy and make them accessible for inspection.
- Use steel posts for posts and beam foundations and seal their ends.

Cladding, Roofing, and Exterior

Siding protects buildings from the elements but can allow pests in through cracks and encourage their spread through rotting wood. Rodents and other pests are also good climbers, so restricting access from the ground should be a priority.

- For siding, use heartwood cedars, redwood, black locust, or fiber cement; provide clearance between siding and soil; minimize gaps from warping and cracking; and seal gaps, openings, and penetrations using lots of low-VOC caulk.
- To limit rodent access to siding and roofs, use flap valves or leaf guards on downspouts, and use cones or discs and high gloss paint to discourage climbing.
- For roofs, use screens and bird exclusion devices on vents, chimneys, or other openings.

Lighting

Exterior point-source white light attracts insects to buildings, so designers should do what they can to reduce its impact, while maintaining safety.

- The guide recommends yellow sodium vapor lighting; though warm/yellow LED lighting is a more energy-efficient substitute.
- Use motion detectors or timers on lighting, especially if using white light.
- Light fixtures should have bird-resistant features that discourage roosting and nesting, such as slopes, or bird exclusion systems, though the latter are not always effective, according to the guide.
- Use reflected light around doors rather than point-source lighting that attracts insects more strongly.

Landscaping

Landscaping can support a variety of pests, and poor planning can result in an increased risk that they will enter your building.

- Keep tree branches 6' away from roofs to deter rats, squirrels, and other vertebrates; keep plants away from the foundation.
  Decks, patios, fences and other structures should be kept away from the building or be removable or allow disassembly to enable inspection.
- Eliminate animal access under sheds, decks, and porches using galvanized hardware cloth, which can be covered with lattice for aesthetics.
- Keep bark mulch away from the foundation for termite prevention.
- Don't use climbing ivy or other plants on buildings.

Interiors

Pests inevitably get inside, but by eliminating access to areas where they might nest, and reducing pathways between rooms, they can be kept from spreading and multiplying.

- Gaps behind baseboards or cheap cove molding is a highway for roaches and a harbor for bedbugs. Use straight base rather than cove, or cove with no gap. Ideally make molding removable for inspection.
- Floors should be crack-free and cleanable, and any gaps between wall and flooring or bottom plates should be sealed.
- Use tight-fitting door sweeps. In areas with heavy rodent traffic, use exterior doors with sheet metal kick plates 12" high and mounted no more than ¼" mounted from the bottom of the door.
- Minimize bedbug hiding places by caulking molding, using hard flooring materials, and making built-in furniture inspectable.
- Avoid headboards and upholstered furniture in bedrooms.
- Seal openings between units to prevent insect movement. (This practice, called compartmentalization, is also a good practice for preventing unwanted movement of tobacco smoke and noise, as well as air movement contributing to the stack effect.)

- Seal well around cabinets in kitchens to prevent pests from making homes under or behind them.
- Make kitchens easy to clean, especially drains in commercial kitchens, which are easily missed and can be a source of roach and fly infestations.

HVAC

HVAC systems penetrate walls and can provide an ideal space for pests. Keeping pests out is critical for maintaining indoor air quality.

- Seal around larger penetrations with rodent-resistant materials such as copper mesh, and use caulk for smaller cracks.
- Use screens on outside air intakes and foam gaskets behind electrical cover plates.

Waste and Recycling

- Trash and recycling areas are ideal spaces for pests. They provide all the essentials—food, moisture, and nesting places—and are usually located near a building entrance, providing easy access.
- Areas used for waste recycling need durable, pest-resistant receptacles with tight lids, and the entire space needs to be designed to be easy to clean and to keep pests out.
- Waste areas holding dumpsters and recycling should also use concrete pads so rodents can't burrow in.
- Round garbage chutes are better than square because there are no corners to trap dirt.

Over the Lifetime of the Building

With careful planning and a team effort, architects, engineers, facility managers, and building owners can minimize the potential health and environmental impacts of these unwanted guests.

Integrating Pest Managers

According to Allison Taisey Allen, director of certifications at the National Pest Management Association (NPMA), a trade group for structural pest management companies, "Integrated pest management is an established and expected practice based on science. It works."

IPM relies on inspecting and monitoring for pests, identifying the pest and infestation level, scaling the appropriate response, assessing its effectiveness, and following up to ensure that pests are under control, she says. But there is a strong emphasis on exclusion among NPMA members, as well as practitioners and pesticide companies.

"Pest management professionals are usually seen as those who protect the structure after it is built," she says, "but there is a great opportunity to see them as consultants and advisors in the construction process."

According to (Lee) Tanner, at the EPA, "It is not enough to just hire a pest management professional, because IPM is a team effort." In areas with known pest problems, structural IPM consultants should be brought in early in the design phase. Santa Clara, California recommends using IPM experts throughout the entire building life-cycle to assess the design, materials, and equipment, and to oversee pest management from construction through occupancy."

For questions on EPA's work on urban IPM, contact Lee Tanner at tanner.lee@epa.gov

New Best Practices Manual for Mosquito Control

Realizing the growing significance of vector control in the wake of the emergence and spread of Zika virus, the Centers for Disease Control and Prevention contracted the American Mosquito Control Association (AMCA) to establish a training and certificate program for mosquito surveillance and control. Subject matter experts first updated AMCA's "Best Management Practices for Integrated Mosquito Management." This document now discusses all integrated mosquito management components in depth and offers users a menu of options regarding the survey and control tools with discussions of their strengths, weaknesses, and costs. Users can now choose which components most closely fit the requirements and resources of their mosquito control entity.

Although the certification program was initially geared towards survey and control of peridomestic mosquitoes, AMCA retooled it to include mosquito surveillance and control techniques applicable to all nuisance and vector mosquitoes. The certification will serve as a certificate of continuing higher educational achievement in the field for those completing the training. The target audiences are those involved in mosquito control in organized districts, but there will be an emphasis on enrolling personnel from areas without established mosquito control districts. AMCA will provide the initial training in 10 "hub" sites throughout the country using recognized mosquito control experts. The program is slated to begin in late 2017.

New Jersey School District Overcomes Pest Control Challenges

Marcia Anderson

Paterson Public School District, the third largest school district in New Jersey, turned to Integrated Pest Management (IPM) in 2009 to get a better handle on the pest-related challenges many urban districts confront. Why? They wanted a path to a safer and smarter way to combat pests and to reduce unnecessary pesticide use.

Once they started implementing IPM in their 54 schools, they realized they were on a course to both improve the health of their students and staff and significantly reduce pest pressures. Seven years later, there is a much better understanding of what draws pests into their buildings and how to prevent them.

Since implementing IPM, communication about pest issues has increased and baseboard pesticide treatments have been eliminated. Treatments have been replaced by improved sanitation, maintenance, pest exclusion, and pest monitoring. Most importantly, the district has witnessed dramatic decreases in absentee rates, and has grown to value IPM and indoor air quality (IAQ) as paramount to education.

Paterson Public School District is one of 31 New Jersey Abbott Districts and, as such, has specific guidelines it must follow, including a special plan that includes IPM. There is an annual review of the plan that follows guidelines on IPM and indoor air quality. There is a concurrent annual review of school pest logs and a statement of assurance, signed by the principal, deputy, superintendent, and facility manager, that the school IPM plan advises all staff that it is illegal to apply pesticides in a school without a license. Pest treatments must be left to the school's designated IPM professional.

Steven Morlino, Executive Director of Facilities Management at Paterson Public School District, found the most challenging part of developing an IPM policy and plan to be educating the principals and educators about IPM and their roles in its implementation. However, staff continuity has been an ongoing challenge in maintaining the successful IPM program, as turnover can be high, and custodial staff are outsourced. Ongoing education has become a key component of success for Paterson Public School District's IPM program.

Mr. Morlino had years of experience bringing IPM to urban school districts prior to his tenure at Paterson. As Executive Director of Facilities for Newark Public Schools, he managed and refined a successful IPM program in their 82 schools. Prior to that, Mr. Morlino was Borough Manager for the New York City Board of Education in charge of 400 schools in Brooklyn/ Staten Island. Mr. Morlino is a New Jersey licensed exterminator with a school IPM designation, has an HVAC mechanical systems design degree, and is a LEED Accredited Professional.

Every school building gets inspected and monitored for pest activity every other week. The service technician conducts an IPM survey and reports the findings. Follow-up is initiated as needed based on the findings. A pest log and all pesticide service records are kept at each school.

In the Paterson School District, sanitation practices are also monitored because they are key components of the IPM program. The custodial staff know that it is important to clean the nooks and crannies, get rid of clutter, and change air filters regularly. Dumpsters are routinely cleaned and inspected, and always covered. Mr. Morlino has found that keeping the staff working together as a team results in a healthier, pest-free environment.

The district's IPM committee meets at least annually and includes the unions, principals, and nurses. In addition, each school has an IPM committee that includes the district chief school officer who sits in every meeting and advises the committee of past challenges and paths forward.

Because New Jersey's School IPM law specifies that only licensed applicators can apply most pesticides in schools, Mr. Morlino and his staff regularly collect over-the-counter pesticides that are brought in by teachers and staff. It is ingrained in much of the public that, if they see a pest, the best and easiest way to solve the problem is to reach for the silver bullet in the can. The spray may kill the bug, however, it does not solve the underlying problem. How did the ant or other pest get in? What attracted it to the classroom? The district encourages reporting of pest incidents to facility staff so they can be dealt with properly, not only for the health and safety of the students, but because state law prohibits the use of pesticides by unlicensed staff. When IPM practices are followed, pesticides are often not necessary to remedy a pest problem. For example, when ants are reported, the facility staff follow their trail and seal the space from which they are entering the building.

Paterson outsources custodial operations, a situation common in many urban districts. The custodial department is a combination of outsourced staff and in-house supervisors. To address the educational challenges this presents and promote continuity among staff, the district holds IPM and IAQ trainings to convey best practices to the contracted custodians.

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An example of the importance of continuity was highlighted in a pest control mystery that plagued a school in Paterson. A raccoon problem developed in one school that tested the district's IPM program. The staff looked high and low for possible places where the raccoons could have gained access to the building, but everything had been sealed.

Nonetheless, seven havoc-wreaking raccoons had already been trapped in one classroom ceiling. Everyone was stumped. They called in a wildlife removal specialist. He rechecked every possible entry point, double checked all seals and even trimmed the overhanging trees. Yet the raccoons kept appearing.

Eventually, it was discovered that the night cleaning crew was propping open the doors. The raccoons were walking into the school through the open doors and finding hiding space in the classroom ceiling.

In December 2015, Mr. Morlino presented at an EPA bed bug webinar, discussing the bed bug IPM plans he had helped devise for the Paterson and Newark school districts. While bed bug infestations are rare in schools, their mention can cause panic and alarm. Mr. Morlino recalled a time when parents, upon hearing about a bed bug incident from their students, insisted on fumigating the entire school. Parents called for emergency community meetings and sought to involve local and state health inspectors.

During the webinar, Mr. Morlino declared; "you must allay the fear and hysteria around bed bugs. The most important things to convey to staff is that bed bugs do not transmit diseases, bed bugs are not related to cleanliness, and a child from a bed bug infested home should not be shunned from school. If a live insect is observed, try and capture it for positive identification, as what staff think is a bed bug very often is not. Identification should be left to the school district's IPM professional. If the insect is a bed bug and if more than one is discovered, student belongings, such as backpacks, coats or personal items, should be isolated in a tight sealing plastic container or bags to help reduce the potential for bed bug dispersal while the problem is being resolved. In the event of a bed bug incident, the IPM designated person and the certified facility manager should be responsible for keeping a running log of all IPM work performed, including communication, directives, and treatment of the pest problem."

Working in a large school district is never boring. There are new challenges every day. Mr. Morlino and the Paterson Public School District have found that through the use of IPM, pest control is a lot more manageable, predictable and provides a healthier environment for students, faculty, and staff.

Want to Implement IPM in Your School District? Start with These Free Tools!

There are numerous resources and tools available to support a school district motivated to provide a healthier learning environment for their students and staff through Integrated Pest Management. EPA's website, Managing Pests in Schools, has information on many such tools and resources developed by both EPA and by IPM stakeholders. In addition, there are two new tools, developed with EPA funding, that take the available resources to a new level.

Stop School Pests - a National IPM Standard Training and Certificate Program - The Stop School Pests project provides a recognized, standardized, peer-reviewed, national IPM training program for school communities. Stop School Pests provides free online and in-class training materials. Learning lessons are available for all school community stakeholder groups, including school administrators, facility managers, pest management professionals/school IPM coordinators, landscape and grounds staff, custodians, maintenance staff, nurses, food service staff and teachers. Exams will be used, in the future, to allow successful students to receive proficiency certificates. Students completing courses, but not taking tests are eligible for certificates of completion.

iSchool Pest Manager - a Central Hub for School IPM Materials - iSchool Pest Manager provides a centralized location and easy access to school IPM materials. The hub contains IPM materials, both nationally applicable and locally oriented, for school districts' use in starting and growing their IPM programs. These resources make it easy for schools to access the information they need to move along the road to IPM. Increasing the number of schools with IPM programs will improve human health and the environment in school communities.

Maintaining Momentum for School IPM

EPA's school IPM team has been hard at work maintaining the energy created at the highly successful School IPM Roundtable. On May 25, 2016, EPA convened 29 representatives of 17 national school, health and pest management associations and federal government agencies in Washington, DC to discuss ideas for implementing a set of principles promoting the adoption of IPM practices in the nation's schools.

The participants discussed strategies for promoting the uptake of IPM in schools through communication and collaboration. They also shared information on current needs and existing resources.

To build on the positive aspects of this momentous gathering, the EPA School IPM team, comprised of regional coordinators and Center of Expertise staff, participated in a much-anticipated meeting on February 3, 2017 with the steering committee of the School IPM 2020 / National School IPM Working Group to discuss efforts taking place throughout the country.

This diverse committee consists of nationally renowned entomologists, extension practitioners, and outreach specialists from universities, state government, and non-profit entities. The committee has the goal of addressing local needs of protecting human health and the environment through education, prevention, and management of IPM strategies for schools throughout the nation.

The meeting highlighted the need for commitment from local school leaders to the concept of IPM and the educational information needed to succeed in implementing a successful IPM program. There was rousing agreement to encourage schools to use the EPA-sponsored resources, such as the Stop School Pests training, a standardized, peer reviewed national IPM training curriculum for school communities, and iSchool Pest Manager, a central hub for school IPM materials, to help them develop and grow their IPM programs.

In addition, organizations such as the National Environmental Health Association actively spearheaded a new cooperative effort with EPA to facilitate the use of IPM in schools. The project aims to promote effective and environmentally sensitive pest management practices in schools through an intensive mentorship program between school districts and local health departments.

Also, the National Pest Management Association in partnership with the Association of Structural Pest Control Regulatory Officials has plans to lead a school IPM walk-through for Roundtable attendees to experience first-hand the benefits of implementing an effective IPM program.

EPA's commitment to protecting children's health and the environment is paramount. Working collaboratively with groups, including the signatories to the Roundtable principles and the School IPM 2020/National School IPM Working Group, is helping to protect our nation's most precious resources: our children!

For more information on developing an IPM program in your school, visit Managing Pest in Schools.

EPA News in Brief: New and Updated Integrated Pest Management Resources

Favorite School IPM Publication Modernized - EPA has released *Pest Control in the School Environment: Implementing Integrated Pest Management (IPM)*. This document is an update to the popular 1993 publication, *Pest Control in the School Environment: Adopting Integrated Pest Management*. The updated version reflects recent innovations in school IPM, provides links to new information, and has been redesigned into an easily printable format. It provides an overview of IPM and details the steps a school can follow to establish an IPM program.

Ten Resources Released in Spanish - EPA has released Spanish-language publications on IPM, featured on EPA's Spanish Website, addressing topics including bed bug prevention and the health benefits IPM can provide to schools. They are:

- Integrated Pest Management - Fact Sheet
- Preventing Pests for Healthier Schools – The Health Case for School IPM
- Making Pests a Thing of the Past – Integrated Pest Management for Healthier Schools
- Model Pesticide Safety and IPM Guidance Policy for School Districts
- Bed Bugs in Schools – Guidance for School Nurses
- Bed Bugs in Schools – Guidance for Administrators, Teachers and Staff
- Bed Bugs in Schools – Guidance for Parents
- Bed Bug Tips Card
- Bed Bug Tips Card for Travel
- Bed Bug Prevention, Detection and Control