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Facility Design

Pest Prevention

By Sewell Simmons

Effective pest management for schools is a challenge. Too often, the design of school facilities unintentionally provides ideal entry points and harborage for pest insects, rodents, and other unwelcome wildlife. However, you can create conditions that discourage pest infestations and make it easier to manage pests. Consider pest management needs during facility design and incorporate features that exclude pests, minimize pest habitat, promote proper sanitation, and facilitate inspection.

“Prevention is the key to effective, least-hazardous pest management programs in schools,” advises Mary-Ann Warmerdam, Director of the Department of Pesticide Regulation. “Pest prevention needs to be a part of the early planning stage of school design. A good design will keep out pests, eliminate pest shelter and make easy cleaning possible. It also reduces the need for future corrective measures and pest management services that can be expensive, as well as disruptive to school operations and activities,” she said.

“In the long term, pest prevention through facility design will reduce overall costs for schools,” said Director Warmerdam.

Several basic structural features cause most problems with pest prevention efforts. Many buildings have doorways and windows that do not fit tightly. Openings associated with heating, ventilation and air conditioning,

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plumbing, electrical service, and fire sprinklers are other common pest entry points. Even in new buildings, electrical conduit, water and gas lines, and communication cables generally have openings large enough to permit pest entry into the building. Wall cavities, ceiling cavities, and the space beneath floors can all provide expansive areas of pest harbor- age inside the building. From these areas, pests can easily enter the rest of a building via the utilities, overhead sus- pended ceilings, and air condition- ing ducts that all provide a very effective pest distribution system.

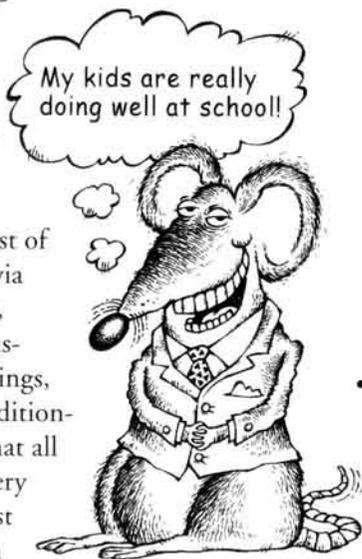
While building codes effectively establish the first line of defense for pest prevention, an effective pest prevention program must go beyond the building code requirements, particularly in aging structures where years of use, break- down of materials, additions or modifi- cations, and changes in use have created conditions favorable to pest access and harborage.

Following are some techniques that managers, staff, and contractors can practice to reduce long-term operating costs.

FACILITY DESIGN

OUTDOOR AREAS BUILDING EXTERIORS AND PERIMETERS:

- Maintain a plant-free zone of about 12 inches around buildings to discourage insects from entering.



- Specify windows with no clear passageways to the inside to prevent access and harborage for pests. Use screen or mesh to modify weep holes in window frames to prevent access by paper wasps.
- Correct structural features that provide opportunities for bird roosting or nesting.
 - Avoid locating decorative lattices over entrances to food services facilities; they inadvertently may serve as bird roosts.
 - Install bird-proof barriers designed to prevent both pigeon and sparrow access to preferred nesting sites.
 - Specify light fixture designs that do not provide opportunities for bird perching, roosting or nesting.
 - Fit eave roof tiles with bird stops (that will also exclude bats, bees and wasps).
- Correct structural features that provide opportunities for rodent harborage or burrowing.
 - Screen or otherwise eliminate animal access under decks, porches, and stairways. Seal porches and ramps to the building foundation with 1/4-inch hardware cloth screen mesh to form a barrier to digging pests such as rats and skunks. This screen must extend 12 inches into the ground and must have a right-angled, 6-inch wide, outward-extending shelf to prevent burrowing under the screen.
 - Screen ventilation louvers with 1/4-inch hardware cloth screen mesh to exclude cats, birds, rodents, and other wildlife (coordinate with mechanical requirements).
 - Maintain a 2-foot wide pea gravel strip (where not readily accessible to students) around buildings to prevent rodent burrowing.
- Use a 3-inch layer of sand for the sand barrier underneath slab construction. Use 1–3 millimeter particle

size in place of unsifted sand to provide a permanent sand barrier to termites (both western subterranean and Formosan termites). This will prevent termites from penetrating cracks in slab construction.

REFUSE AND RECYCLING AREAS:

- Place outdoor garbage containers, bins, and compactors on hard, cleanable surfaces, away from building entrances (at least 30 feet from doorways). Design site with properly graded concrete or asphalt pads to prevent rats from establishing burrows beneath them.
- Design site with solid enclosure that extends all the way to the ground level. Use metal or synthetic materials, not wood or chain-link fence, for example, to prevent rodents from gnawing and climbing the enclosure.
- If trash will be stored, design storage areas that can be closed off from the rest of the building.
- Locate storage areas for boxes, paper supplies and other materials in areas separate from where food or trash is stored. When stored together, these materials favor pests by providing food and shelter.

LANDSCAPED AREAS:

- When selecting plants, choose plants known to do well in the area intended for planting. Avoid those known to have a history of pest problems. Use resistant plant species and cultivars when available. Plant a variety of trees and shrubs. Check with your university or cooperative extension service for recommendations.
- Give preference to plants that shed a minimum of blossoms, seeds and fruits, since they may attract and support insects, rodents, and undesired birds.
- Design with diversity. Include a wide variety of plants in the landscape to reduce the pest damage potential.
- Provide a properly prepared site. Site selection is critical; the site must be

compatible with the plants' requirements.

- Design landscaped areas with flexibility to allow for campus additions, which may change drainage, exposure to sunlight, ventilation, or other plant requirements.
- Avoid crowding landscape plantings.
- Group plantings with similar cultural requirements.
- Install or retrofit fence lines and other turf or landscape borders with concrete mowing strips.
- Avoid planting vegetation directly against buildings – this provides shelter and sheltered runways for rodents.
- For the same reason, avoid planting dense vegetation that completely covers the ground.
- Do not plant vines that climb building walls as these create runways for rodents and harborage for undesired bird species.
- Plant trees away from buildings to prevent easy access to buildings for insects and rodents.
- Give careful consideration to placement of deciduous trees. Leaves, which accumulate along foundations, provide harborage and sheltered runways for rodents.

INDOOR AREAS

FOOD PREPARATION AND

SERVING AREAS (main kitchen, dining room, teachers' lounge, snack area, vending machines, and food storage rooms):

- Ensure that new kitchen appliances and fixtures are of pest-resistant design, i.e., open design, few to no hiding places for roaches, freestanding and on casters for easy, thorough cleaning.
- Provide space under and around appliances and equipment in kitchen areas to allow maximum ventilation and ease of (steam) cleaning.
- Use coving at floor-to-wall junctures to minimize build-up of debris and to facilitate cleaning.

- Slope floors in kitchen areas to provide good drainage after cleaning.
- Do not install pegboard in kitchens, animal rooms, or laboratories because it provides cockroach harborage.
- Ensure that all pipe insulation has a smooth surface with no gaps between pieces.

CLASSROOMS AND OFFICES:

- Ensure that new office and classroom furniture that is rarely moved (e.g., staff desks, bookcases, filing cabinets) is designed to permit complete cleaning under and around the furniture, or is designed to allow ready movement for cleaning purposes.
- Design or retrofit construction to provide adequate ventilation indoors, preventing trapped moisture and condensation (particularly in rooms with sinks).

STORAGE AREAS

Equip area with self-closing doors.

Although facility design is the emphasis here, it cannot stand alone. A strong preventive maintenance program is essential on a continuing basis. Poor sanitation or leaving entryways open will make even the best-designed and constructed facility susceptible to pest problems. Using the practices discussed above, together with scheduled, routine inspections and awareness of potential pest problems, can greatly reduce or eliminate the potential for infestations, especially when followed by responsible maintenance. If you follow these practices, you will reduce long-term pest management costs. For a bibliography and more resources about facility design and maintenance practices, go to www.schoolipm.info, click on "Managing Pests" in the left column, then click on "Pest Prevention and Management." 

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