

# Welcome to: Design and Build for Pest Prevention



Find handouts and the recording for today's presentation visit:

<http://stoppests.org/go/IPMbuildings>

The webinar will start shortly, while we wait, please tell us in the chat:

**Where are you from?**

**What pest concerns you most?**

# Design and Build for Pest Prevention



- StopPests is a program of the Northeastern IPM Center of Cornell University, funded by HUD's Office of Lead Hazard Control and Healthy Homes.
- We provide free IPM training and consultation
- Products, vendors or commercial services pictured or mentioned are illustrative, not endorsements.

[Webinars](#)[Request Training](#)[Pest Solutions](#)[Guidance on Pest Control during the Coronavirus](#)

## News You Can Use

March 24, 2023 **Up-coming StopPests Webinars on IPM in Construction and Eliminating Cockroaches from Affordable Housing** Check out these up-coming training opportunities for housing and pest control professionals: Design and Build for Pest Prevention in Multifamily Housing Join StopPests in Housing on May 2nd, 2023 at 1:00 - 2:15 PM Eastern for a presentation on incorporating integrated pest New construction photo from American Association of Realtors...



## Related Stories

- **Pest Control Operations and Social Distancing in Multi-Family Housing During the COVID-19/Coronavirus Outbreak**
- **Reducing Pest Infestations in Multifamily Housing**
- **IPM Toolkit: New Resource to Hire, Assess, and Improve Pest Management in Affordable Housing**

### ABOUT US

- Staff and Partners
- Participating Providers
- Conference Presentations

### WHAT IS IPM?

- Definitions
- Using IPM
- Funding Sources

### WORKING WITH RESIDENTS

- Residents' Briefing Video
- Help with Housekeeping
- Getting Help

### IPM TRAINING

- Online Course
- The Training Day
- Training Materials
- Training Opportunities
- Webinars

### SUCCESS STORIES

- Evaluate Your Success
- Case Studies
- Research Database



Bayview

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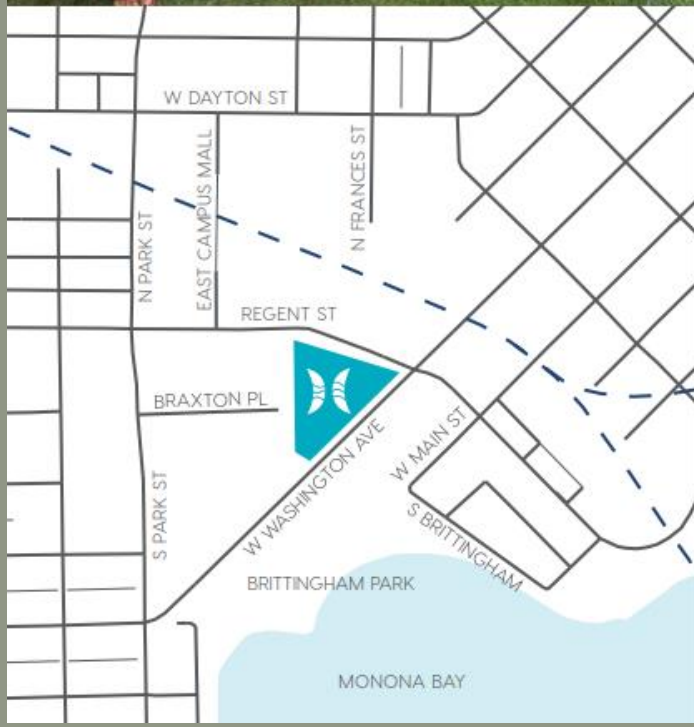
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Everyone is muted. Use the Q&A feature to ask a question or the chat to share a comment.

# DESIGN AND BUILD FOR PEST PREVENTION

*Build as if your children are growing up here!*





# We Are Bayview

## A DIFFERENT KIND OF NEIGHBORHOOD

In the heart of downtown Madison, less than a mile from both the UW campus and the State Capitol, you'll find a unique and thriving community called Bayview.

Anyone who has spent time here will tell you—Bayview is special. People know one another's names. Kids from profoundly different backgrounds run around together and play. Townhouse patios are personalized, and lush community gardens yield varied harvests.

This unique neighborhood is grounded in a model for affordable housing that is much more than four walls and a roof. It's founded on generations of deeply connected and resident-centered community development.

# Bayview at a Glance



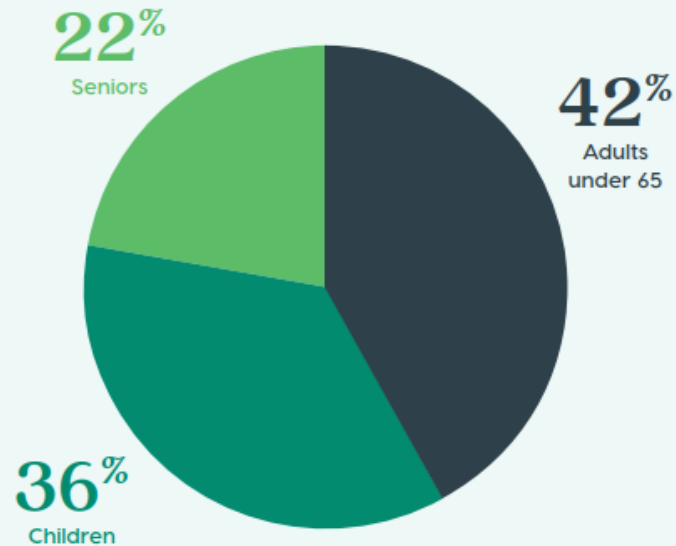
**86%**  
of residents speak  
English as a second  
language

**277**  
residents

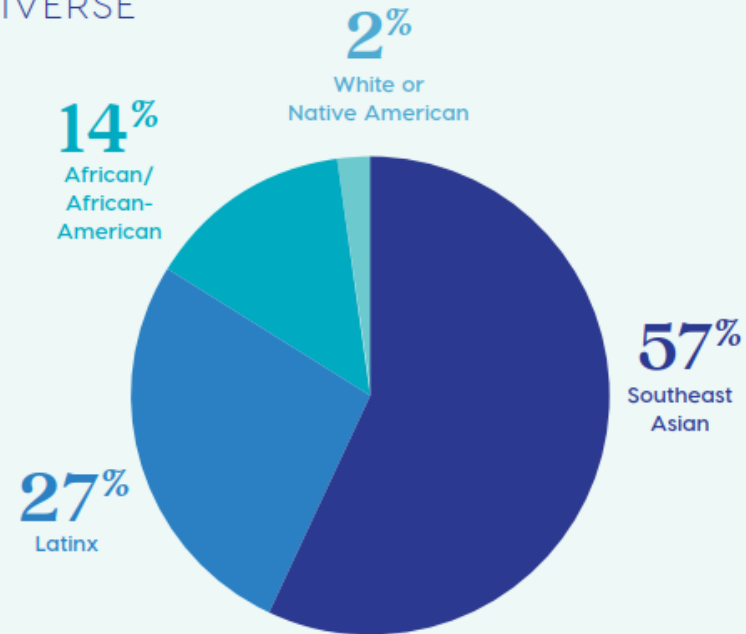


**30%**  
of households  
have a member  
with a disability

## MULTIGENERATIONAL



## DIVERSE



As of December 2020

## HOUSING

Since 1971, Bayview has been a place to grow roots, raise families, connect to the community, and thrive. Located in the historic Triangle Neighborhood, Bayview has long served as an anchor for affordable housing in downtown Madison, helping prevent displacement of the poor caused by rapid gentrification, and raising the next generation out of poverty.

**93%**

of current  
households eligible for federal  
housing assistance

which limits their rent  
and utilities to

**30%**

of their income

**\$15,000**

average annual income of residents  
who qualify for subsidy





# ABOUT GREEN PEST AND TICK CONTROL

WE ARE AN INNOVATIVE SPECIALIST COMPANY PROVIDING **CONSULTING** AND **SERVICE** FOR LONG-TERM SUSTAINABLE PEST ELIMINATION.

WE ASK WHY IS THE PEST THERE,  
NOT WHAT IS THE BEST PESTICIDE TO APPLY.

BY ADDRESSING PEST-FRIENDLY CONDITIONS,  
WE ACHIEVE HEALTHY, PEST-FREE ENVIRONMENTS.



**PESTS AND  
AVOIDABLE  
PESTICIDE USE  
ARE NOT  
ACCEPTABLE**

**CHILDREN  
ARE  
ESPECIALLY  
VULNERABLE  
TO HARM  
FROM PESTS  
AND  
PESTICIDES**

### **ASTHMA**

Exposure to cockroaches, dust mites, mice and mold can cause children to develop **asthma**, and can trigger asthma attacks. More than 10% of kids in the US have asthma.

### **FOOD SAFETY**

Ant, flies, rodents, cockroaches and other pests can carry **pathogens** to food and food preparation surfaces.

### **FIRE SAFETY**

Rodents chew on wires and can cause short circuits and fires.

### **PESTICIDES**

Pesticides are important tools but hundreds of pesticide products have been removed from the market after unacceptable risks have been discovered including impacts on human health and environment.

### **RESISTANCE**

Exposing pests to the same pesticides over time results in resistance. More than 50 weeds are now no longer affected by glyphosate, the active ingredient in Round Up weed killer.

## SOLUTION: INTEGRATED PEST MANAGEMENT



### RESULTS!

When Green Pest and Tick replaced the prior pest control company at this multi-family community, more than a third of the 102 units were infested with mice and a similar number were infested with German cockroaches.

Now mouse problems rarely occur, and less than a handful of units have occasional German cockroach captures on monitors.

### HOW?

We eliminate conditions that lead to pest problems. **Zero** rodent poison used. Any rodents present were trapped. Very little insecticide used.

### WE CLOSE THE GAPS!

We focus on eliminate access points, travel ways, nesting/harborage opportunities, and places where food and spills can accumulate.

### INSPECT AND MONITOR

We check regularly for pests and pest-friendly conditions.

# DESIGN AND BUILD STRATEGIES

## DESIGN PEST-PROOF EXTERIORS

Specify pest-proof building materials. Pay special attention to seams, e.g., between foundation and siding, doors and door sills. Weep holes should be sealed with permeable metal mesh.

## DESIGN PEST-PROOF INTERIORS

Avoid cabinetry and fixtures with built-in gaps that allow access, travel and nesting opportunities for insects and rodents, and cavities that can trap food and other debris.

## BUILD WITH NO GAPS

Gaps under baseboards invite food debris, liquid spills and provide breeding/feeding opportunities for ants, cockroaches, flies, stored product moths and beetles.

## TRAINING AND OVERSIGHT

Entire team including managers, subs need training on what's different than typical design and build. Competent oversight is essential to ensure accurate execution.

A landscape of rolling green hills under a cloudy sky. The foreground is dominated by tall, green grasses. In the middle ground, there are several rows of crops, possibly corn, planted in a grid pattern. The background shows more rolling hills and a few scattered trees. The sky is filled with soft, grey clouds, suggesting an overcast day. A central text box with a yellow border contains the text "DESIGN ISSUES".

# DESIGN ISSUES



Cabinet designs with features like this plastic corner clip should be avoided. The clip provides harborage for German cockroaches.



HVAC must be in a dedicated closet with no storage allowed.

Appliances are a tight fit here with door to one appliance obstructed.



Some HVAC closets had excessive wasted open space that residents will be tempted to use for storage despite the prohibition on storing items in these closets.





High-risk wiring. Avoid running unprotected wiring across open spaces to reduce damage/need to replace or repair after wiring is snagged and pulled inadvertently.



Cabinet designs should avoid unnecessary gaps such as these behind false drawer fronts on under sink cabinets.



Cabinet designs and installs must avoid open voids like this one, shown from underneath the cabinet above the backsplash, that allow pest access to the space behind the cabinet..



Unnecessary electrical penetrations in cabinets, such as this one in the base of the cabinet above the range hood, should be avoided during the design stage. Food debris will fall from cabinet into the top of the hood.

Range hoods are typically direct wired or wired through a junction box mounted in the wall.

Note also the rough cut on the cabinet back wall, creating a gap that needs sealing to keep food debris from accumulating in the gap and providing a food source for ants, cockroaches and stored product pests.



Gaps in upper cabinets that can't be avoided in the design stage should be boxed in top and bottom. Small gaps can be sealed with elastomeric sealants.



Gaps in upper cabinets that can't be avoided in the design stage should be boxed in top and bottom. Small gaps can be sealed with elastomeric sealants.



# INSTALL ISSUES



Backsplashes must be completely sealed on tops, sides and exposed bottom portions – not just the junctions that are visible.

Gaps like this provide ideal harborage for German cockroaches.





Gaps in baseboards need to be sealed to prevent food, liquids and other debris from accumulating, and prevent pest access to the wall cavity behind the baseboard.



The top picture was taken in a kitchen – every time the kitchen floor is swept, food debris is likely to be pushed into this crevice.



Gaps under backsplashes and between countertops and cabinets must be sealed with an elastomeric sealant to prevent pest access and reduce potential for water to contact unsealed particle board which results in swelling and cracking.



Laminate must be firmly attached to all cut ends of countertops to prevent moisture being absorbed into the particle board and swelling and cracking.



This cabinet has been improperly cut to speed installation.

Now pests have access to the space behind the cabinet, and food can be accidentally spilled behind the cabinet.



Improper cuts at the top of cabinets, both back and sides, leave wide open access to the void behind the cabinet, and access to the other cabinets, drawers, etc.



Poorly measured and cut openings must be avoided, and correctly when they occur. This provides pest access and also violates building codes.



This outlet box was installed improperly and the carpenter cut out the base of the cabinet to accommodate the error rather than have it fixed properly.



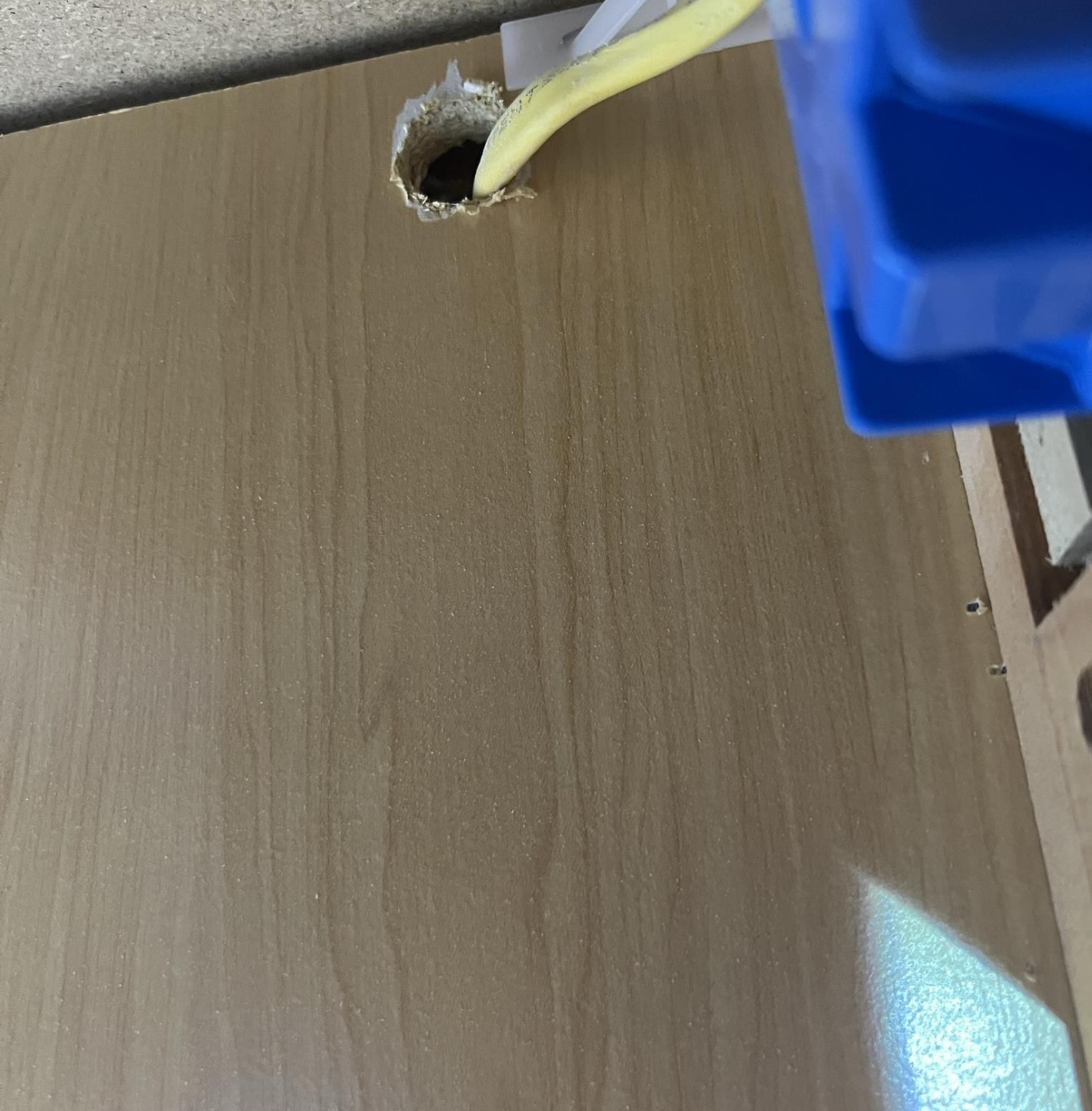
Blind screw holes need to be sealed to prevent pest access.

Note also the gap where sidewall meets cabinet floor, plenty large enough to trap food debris and provide access to harborage for cockroaches, and access for ants, silverfish, firebrats, centipedes and other small insects.





Another example of poor measurement and cutting.



All electrical penetrations need to be sealed, including this hole for wiring to ADA switches mounted on cabinets.

Note the large gap between countertop and cabinet side wall, also must be sealed.



We used DAP silicone sealant and Xcluder stainless steel mesh to seal undersink cabinets post-construction.

Where plumbing and electrical penetrated undersink cabinets to connect to the dishwasher, we used stainless mesh alone to allow easy removal in the event the dishwasher needs service/replacement.



Another shot of sealing with Xcluder secured in place with sealant.

It took just over two hours per unit on average to complete sealing.



Gaps under baseboards, under toilets and where cabinet bases, kickplates meet floors are all being sealed post-construction to keep debris, spills, urine from penetrating and causing swelling and cracking of particle board, urine odors and other avoidable problems going forward.

Clear silicone sealant was used that applies white as shown here and clears as it dries.



Baseboard areas behind all appliances including stoves, fridges and dishwashers need to be complete with baseboard and elastomeric sealant where needed to close all gaps where food may accumulate, spills may contact drywall and pests might access wall cavity.

Baseboards were not sealed behind stoves and dishwashers. Some walls behind fridges had baseboard installed but many had gaps underneath, in corners.



All electrical switch and outlet cover plates need to be tight to the wall, unlike this and many other outlet covers behind appliances, in cabinets.

Improperly cutting the undersink cabinet backwalls resulted in many of them being buckled and thus outlet covers not fitting tightly.



Spaces behind closet door hinges need to be sealed to eliminate pest access to the wall void and avoid accumulation of debris in the void.





Ditto re spaces created for closet doors to shut.



Gaps such as that between the receiving pipe and the entering pipe need to be sealed. If air and liquids must be allowed to pass, stainless mesh can be used to close the gap.



Most penetrations for these HVAC condensation drains were unsealed, proving open access to the wall void.

Some were sealed with fire caulk. We sealed post construction with silicone sealant.



Escutcheon plates need to be firmly sealed to the wall with elastomeric sealant such as silicone. The pipes they encircle need to be completely free of fire caulk to allow the plate to be moved against the wall to ensure a tight fit.

Loose escutcheon plates can allow pest access to the wall cavity behind the plate, and provide ideal harborage behind the loose plate itself for German cockroaches.



Missing escutcheon plates around drainpipes can provide access to the space behind the cabinet and the wall cavity.

These need to be fitted with escutcheon plates that fit tightly around the pipe and to the cabinet wall.

Oatey makes a plastic split ring escutcheon plate for this purpose. An elastomeric sealant can be used to secure the plate if necessary.



Fire caulk should only be used where specified by code. Elsewhere, an elastomeric sealant should be used. This rough application of fire caulk needs trimming so that the escutcheon plate can be firmly secured to the wall.



Avoid placing pipe joints where escutcheon plates need to be installed. This joint prevents a standard plate from fitting properly.



Undersink plumbing penetrations need to be placed so that escutcheon plates can be installed without overlap.

Overlap prevents a tight seal between the plate and wall.





Overlap with electrical boxes/cover plates also need to be avoided to enable proper sealing of escutcheon plates.

A landscape photograph of rolling green hills under a cloudy sky. A yellow rectangular box is overlaid on the center of the image, containing the text "EXTERIOR ISSUES" in a bold, yellow, sans-serif font. The text is arranged in two lines: "EXTERIOR" on the top line and "ISSUES" on the bottom line. The background shows a vast field of green grass or crops, with a few trees scattered in the distance under a grey, overcast sky.

# EXTERIOR ISSUES



Design elements that create protruding ledges or in this case a protected nook invite bird roosting and nesting, and rodent nesting. These design features should be avoided wherever possible.

This is a squirrel nest build above a first-floor patio between the deck joists for the unit above.

These are typically addressed by installing plastic or preferably stainless mesh to block off access to the nook.

Protruding ledges are typically addressed with bird wire or spikes which must be carefully installed to be effective.



Gaps of any kind on exterior provides access for spiders and insects including bees and wasps, ants, stink bugs, lady beetles, box elder bugs and others.

Bats need only a 3/8" gap to access a cavity, mice 1/4". Mice are good climbers and can access gaps at height.

From the outside, it's not always possible to determine if a gap provides access to a cavity.

Unsealed gaps like this one, where siding is bowed out, are perfect harborage for spiders during the daytime. Spider making homes on building exteriors stain exterior surfaces with excrement that is difficult to remove.



Additional large gaps between siding boards. This gap is large enough for bats or mice to enter. Can they access a cavity once they get behind the siding? We don't know and so have to assume yes and seal these up.



Unsealed vertical gaps also provide access to the cavity underneath the siding board above the gap.

That's a box elder bug exploring the building exterior for opportunities to find a home for the winter. Stink bugs, lady beetles, cluster flies and other insects similarly scout out structures for gaps, and can build up in large numbers, often finding their way into the structure in the fall, or winter/spring as they end their winter resting stage.

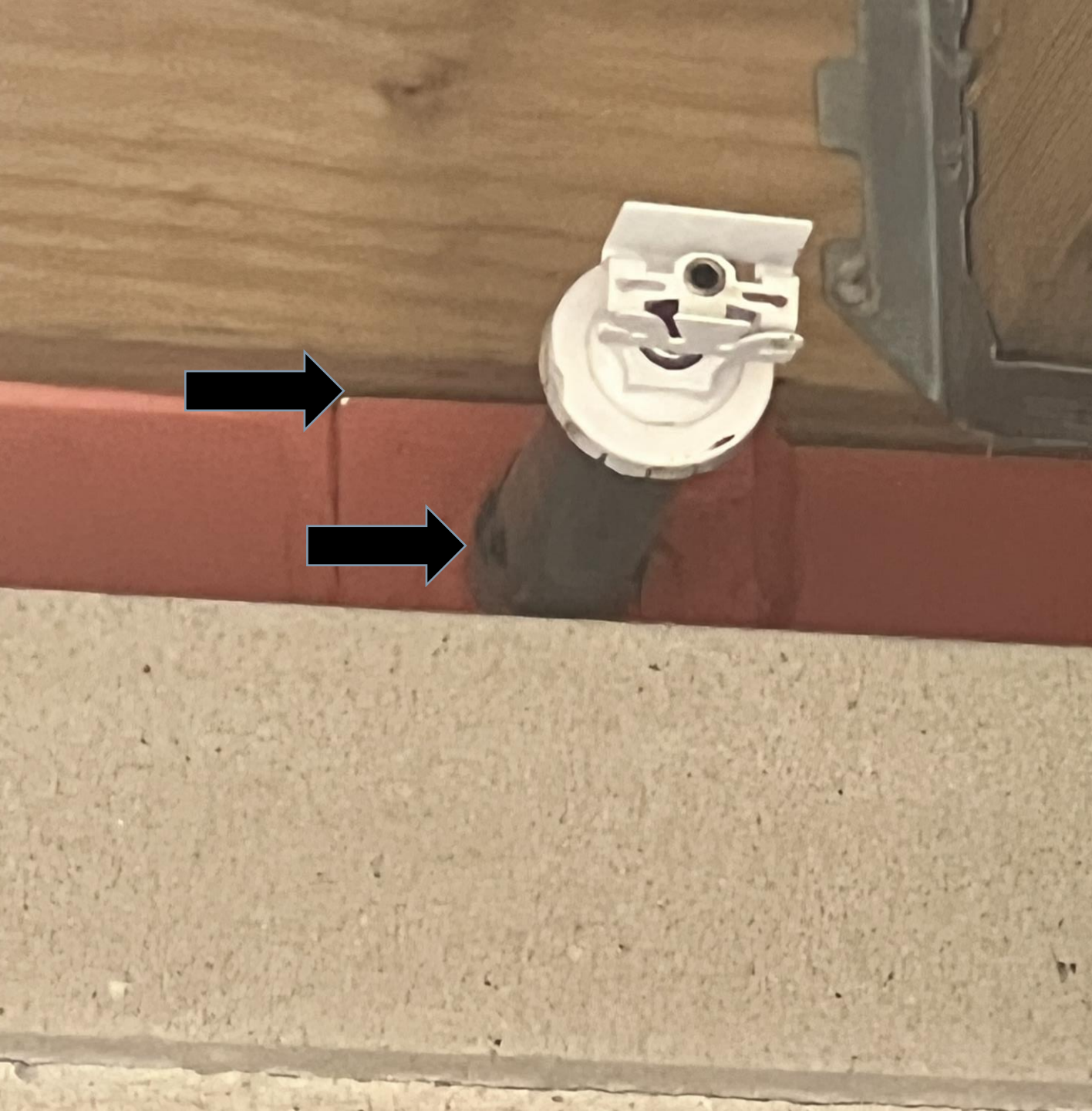


Additional gaps in sealant beads. Picture above right shows fungal growth exposed when the squirrel nest was removed.



Large gaps in flashing should be stuffed with Xcluder or similar water-permeable material to eliminate pest access/harborage.





Gaps around all penetrations need to be sealed. There is also an unsealed gap along the top of this siding board.

Exterior gaps like these are prime nesting opportunities for bees and wasps.





Large gaps at lower (and likely also upper) ends of corner bead need to be stuffed, I use Xcluder mesh secured with silicone sealant. Xcluder allows air and water to escape.

Also unsealed flashing needs to be sealed.



The gap in this expansion joint is likely to lead to water penetration which may be extensive enough to cause concrete to crack when that water freezes. It's also large enough to allow small rodent entry with potential for burrowing.

Is the cavity below the gap large enough for either of those scenarios to occur? We can't tell so needs to be sealed with an elastomeric filler. I would shoot some expanding foam down into the gap and leave an inch open on top to fill with a self-leveling elastomeric sealant.



**QA/QC**



Careful oversight is needed to ensure specifications are followed.



Incompletely sealed weep hole.



Incompletely sealed seam.



## SUMMARY:

## DESIGN

### DESIGN

1. Avoid cabinetry with unnecessary gaps.
2. Design for dedicated HVAC closets without wasted space or high-risk wiring.
3. Design carpet transitions that protect edges.
4. Avoid protrusions and cavities when designing exteriors to limit opportunities for bird/rodent roosting and nesting.

## **SUMMARY:**

### **INSTALL**

### **SEAL ALL GAPS INTERIOR AND EXTERIOR**

1. Seal plumbing penetrations under kitchen and lavatory sinks:
  - a. add escutcheons on all pipes including drainpipes as needed
  - b. secure loose existing escutcheons on hot and cold sink water supply lines, dishwasher water supply lines
  - c. dishwasher vent penetration, electrical penetrations
  - d. stuff dishwasher penetrations with stainless mesh
  - e. avoid overlapping escutcheon plates, overlaps with edges, switch/outlet plate covers
2. Seal escutcheons on toilet supply line.
3. Seal gaps as needed including:
  - a. under-sink cabinet walls, bases, junctions with countertop
  - b. between floor and baseboards throughout including behind washer/dryer, between floor and base of toilets, floor and kickplates
  - c. install/seal baseboard behind stove, dishwasher, fridge
  - d. between cabinet fronts/sides and countertops
  - e. between walls and cabinet sides
  - f. between walls and side edges and undersides of backsplashes
  - g. gaps in HVAC closets including electrical, plumbing and HVAC penetrations and under baseboards
  - h. where cabinet doors meet walls at baseboard level
  - i. between exterior siding pieces and all exterior penetrations.

## SUMMARY:

### QA/QC

Ensure elimination of gaps is included in design plans and specifications.

Provide competent oversight to ensure accurate and complete compliance with these specs.

Inspect all units for issues.

Fully complete a model unit for owner inspection prior to proceeding with interior finish work on additional units.

**THANK YOU  
FOR YOUR  
EFFORTS TO  
HELP KEEP  
ALL HOUSING  
PEST-FREE!**

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