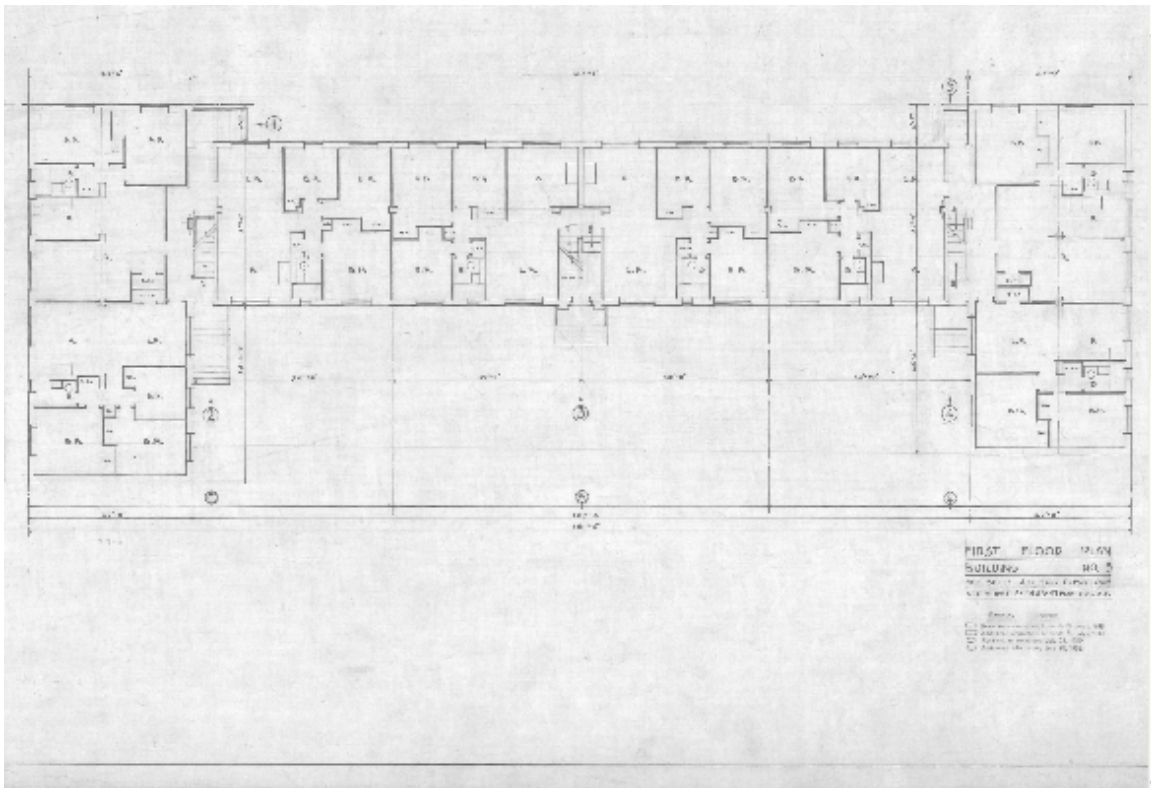


# Guidebook for Structural Approaches to Integrated Pest Management



Prepared by  
Dr. Mitchell D. Allen  
Boston Housing Authority  
2009



## Forward

The following booklet is intended to act as a written and visual guide for finding structural solutions to pest problems. The Boston Housing Authority's Integrated Pest Management Program (IPM) has had great success in reducing the root causes to pest infestation in public housing and reducing the level of pesticide usage. This booklet is designed to help those who utilize IPM programs to take a further step. In that sense, it is meant as the first word on the subject, not the last. I expect to add to this as additional problems and solutions are developed.

The origins of this effort are traceable back to conversations I had with Don Rivard as far back as 2002, when the original BHA IPM program was being developed. The more immediate source came as a result of renewed conversations I had with John Kane and Lori Luce, both of the BHA and both primarily responsible for the success of IPM at the Boston Housing Authority. John was able to secure funding for this project from the Kellogg Grant and offer excellent advice. Lori helped shepherd the project from the beginning, with everything from advice to editing.

The bulk of the source material and development of methodology came from Watch-All, an excellent IPM vendor located in Weymouth, MA. Watch-All has been our principle IPM vendor at the BHA, and has a matchless understanding of the problems associated with the structural aspects of Integrated Pest Management. They began as a construction company and evolved into a pest control provider as a result of repairing termite damage. Thus, their approach to pest problems focuses on the structural aspects. Most of the pictures that follow come from their files, as do all of the solutions.

My thanks go to Lori Luce, John Kane and Gail Livingston of the Boston Housing Authority for lending their aid in getting this done. It also goes to Jon Boyar and Doug Hayes of Watch-All for their expertise and information. Behind these people stands a larger group of people who warrant both a larger description and my thanks.

The Healthy Pest Free Housing Initiative (HPFHI) is a collaborative project aimed at reducing pest infestation and pesticide use in public housing in Boston. HPFHI is funded with support from the W.K Kellogg Foundation and the U. S. Environmental Protection Agency. The primary focus of HPFHI is implementation of integrated pest management (IPM), a safer and more effective alternative to traditional pest control, that relies on residents, managers and pest control companies working together to reduce pest infestation. This booklet is the logical outcome of this initiative.

Partners include the Boston Public Health Commission which serves as the lead agency, Committee for Boston Public Housing, the West Broadway Task Force, the Boston Housing Authority, the Boston University School of Public Health, the Asthma Regional Council, the Massachusetts Public Health Association, and the Boston Urban Asthma Coalition.

Mitch Allen  
Project Manager  
Capital Construction Department  
Boston Housing Authority

# **Introduction To Structural Integrated Pest Management**

## General:

Integrated Pest Management (IPM) is a systematic strategy for eliminating pests. It focuses upon eliminating the root causes of infestation, in preference to simply applying chemicals for a short term result. It is a more structured, detailed, and long-term approach which sometimes costs more money in the beginning, but saves much more in the end. In addition, by reducing dependence upon the use of chemical pesticides, IPM is considered to be a part of the Green Movement.

The root cause of all infestation can be traced to the needs common to all living things: food, water and shelter. By the elimination of each of these needs, the infestation will ultimately cease. However, this elimination requires the cooperation of anyone living or working on the site, and thus includes the Capital Construction Department. This Guide is intended to supply project managers and construction superintendents with practical information on how to advance this goal.

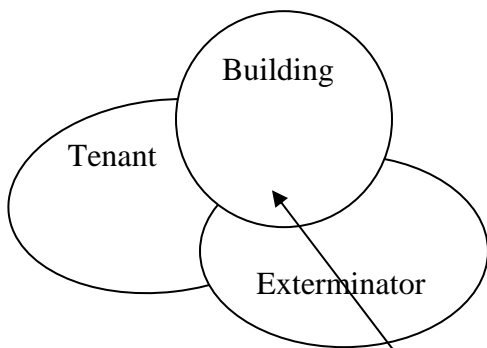
## The BHA Situation:

The Boston Housing Authority, like all entities containing a transient population, is particularly vulnerable to pest infestation. This vulnerability is compounded by aging structures and an often indifferent and uninformed tenant population and building staff. Such a combination would seem to make the BHA a poor choice for an IPM strategy, but where the program has been correctly applied and backed by adequate training, it has proved successful in fairly short order.

Prior to the implementation of an IPM program, a typical BHA building manager would use a standard extermination contract with any of a wide range of contractors. Results would vary in the short term, but in the long term, nothing would change. The pesticides might "harvest" a lot of pests, but those pest not contacted by the pesticide would ultimately reappear and the cycle would begin again. The only people that benefited were the exterminators, who essentially had a captive client.

The core of the problem in such a situation is this: each of the three parties involved, namely the exterminator, the building (and its staff), and the tenant population, were in a position where each could plausibly blame the other two. The exterminator, when given a "call back" for a failure to adequately reduce the pest population, could easily blame the tenant's living habits and/or the building condition. The tenants, likewise, could blame the building, its incompetent staff, and the incompetent exterminator. The BHA staff, similarly, could point fingers at the other two using the exact same arguments. Since no one could definitively pin the blame anywhere, the exterminator had a free ride.

Visually, one could portray this issue like this:



In essence, the pest population exists here, at the nexus of these three groups. Since the true elimination of a pest problem requires cooperation in the areas where these responsibilities overlap, no real progress was ever made. The goal, then, is to eliminate this overlap, and define responsibilities.

The BHA Solution:

The BHA's approach to solving this problem is actually pretty simple. We cannot fire the building itself, or all of it's staff, nor can we chase out all of the tenants. What the BHA *can* do is to change the responsibility of the contractor from extermination to documentation. The core of every IPM program is to document the source of infestation through the placement of bait traps and other methods to pinpoint the root causes. By monitoring the traps, the IPM Contractor can determine whether the cause of the problem is the building itself, poor cleaning habits by the tenants, incompetent maintenance by the staff, or what have you. If the contractor notes building-related problems, such as open pipe chases, standing water, and dirty trash chutes, these should generate the appropriate work orders or Site Initiatives. Larger structural problems become the province of CCD. Poor tenant living habits should result in intervention by the Building Staff or Social Services, as needed. Ultimately, it could (and has) resulted in eviction. Building Staff shortcomings should result in training or better supervision. The IPM Contractor may also choose to apply some limited forms of pesticides, but usually in a much more limited and 'tactical' sense than an exterminator 'flush out.' In each case, the basis of action stands upon the evidence created by IPM Contractors documentation.

CCD's Role:

The bulk of BHA IPM work is carried out by Operations, of course. The Preventive Maintenance Supervisors often work in conjunction with Building Staff to develop a program and to hire the right contractor and conduct tenant and staff training. The Capital Construction Department has at least one role, and potentially more, that would support Operations.

At the first and most basic level, a CCD Project Manager should be in contact with the relevant Operations personnel to learn what, if any, IPM program may be in place at any site that he or she is intending to conduct work. There is more to this than simple

courtesy—the wrong step by a contractor can undo years' worth of patient and expensive IPM work. For example, if a plumbing contractor is working in the basement of a building, and chooses to “bomb” or “fog” the work area, he will probably chase a pest population back into areas where they have been previously eliminated. This will essentially destroy the documentation effort outlined previously. At a more technical level, most of the pest treatments (such as gel baits) used in IPM work are designed to attract pests, and then attack their reproductive systems and so forth. They are relatively expensive and meant to have a long duration. Conversely, most insecticides are designed to repel pests or to kill on contact. When the spray of fogs coats gel baits, they effectively neutralize them. Thus, the BHA ends up paying for the work several times over with little to show for it.

Beyond communication, the Capital Construction Department can potentially incorporate other IPM-friendly practices into its own work. This can exist at the design level, by requesting that our consultants these practices within their design specifications. On a construction level, there are numerous practical measures that can be taken. These will be outlined below.

### Design

As noted previously, the first thing a project manager should do is to direct the consultant to contact the development management staff to ascertain whether an IPM program is in place, and the nature of the work being done. The development staff will likely put the consultant in contact with the IPM vendor who shall, in turn, inform the consultant as to what, if any, specific measures need to be taken to limit any disruption to the IPM program. This may be as simple as the consultant specify who is to be called if a contractor is doing work in certain areas, or as detailed as including certain provisions with the construction documents.

An example of the latter would be a building envelope job. In consultation with the IPM vendor, the A/E could call for certain materials to be used when filling any exterior wall penetrations, the use of door sweeps, and other methods of preventing pest access to buildings.

Certain specific construction problems recur in pest control. These primarily relate to pest access and harborage. To human beings, walls represent obstacles that impede movement. To a pest, whether it is an insect, bird or rodent, interior and exterior walls represent a highway that can allow travel throughout much of the building, and frustrate attempts at pest elimination. Thus, the need to focus on sealing joints and penetrations is paramount. While most specifications include language to this effect to some degree, this language may need to be strengthened and the supervisory personnel be made aware of the need to document that the work was done appropriately.

What follows below is a copy of the Directive issued by the Boston Housing Authority's Capital Construction Department on January 5<sup>th</sup>, 2009. It contains the approach to be followed in this effort:

## CCD DIRECTIVE 08-001

Date: January 5, 2009  
To: CCD Staff  
From: Shirley Ransom, Director  
Capital Construction Department  
Subject: Integrated Pest Management

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- 0.0 General. Integrated Pest Management (IPM) is a systematic strategy for eliminating pests. It focuses upon eliminating the root causes of infestation, in preference to simply applying chemicals for a short term result. It is a more structured, detailed, and long-term approach which sometimes costs more money in the beginning, but saves much more in the end. CCD has a role to play in the BHA's IPM initiative.
- 1.0 Planning
- A. Include discussion of IPM conditions as an integral part of capital planning
  - B. IPM Program. Review status of program for the site with Operations. Confirm nature, location(s) and extent of current infestation, preferably in writing.
- 2.0 Design
- A. Existing Conditions Report. Review shall note all areas likely to be effected by any new work, including, but not be limited to, evaluation of the following:
    - 1. Name and Contact Information of current IPM Contractor
    - 2. Current Level of Infestation in the work area and adjacent areas as reported by IPM Contractor.
    - 3. Schedule for future IPM treatments.
    - 4. List of any pest control products currently in use.
  - B. General Design Issues. The principle focus of this directive is to reduce pest infestation by means of reducing pest access to food, water, and harborage. All of the items in the General Design Section should be approached with this in mind. Specific practices included but not limited to the following:
    - 1. Seal all pipe chases, electrical lines, wire mold or other wall, floor or ceiling penetrations that connect apartment to apartment or room to room with copper wool, caulking, or foam filler as appropriate, and cap with an escutcheon plate when possible.

2. Seal all ducts and return air lines. Install and seal screens over all vent openings
3. Use gaskets behind wall outlet covers and switch plates (the type used to prevent air infiltration).
4. Preference is to be given to straight base over cove base.
5. Require the use of silicon caulk to seal edges between counter tops and walls, around tubs and between lavatories and walls.
6. All coring abandoned within the scope of work shall be sealed with concrete or other approved material and made to match surrounding surfaces. Otherwise utilize approved non-deteriorating materials and match surrounding surfaces.
7. Utilize solid core doors where possible.
8. Utilize door sweeps where possible
9. All floor drains to have sturdy replaceable metal grates.
10. Insulate all piping prone to condensation.
11. Utilize low sodium (yellow) lighting instead of high UV lighting.
12. For all Site work, see CCD Directive 06-02 Plant Materials, Landscaping, Sitework and Site Restoration.
13. Call for dumpsters with side openings and metal covers.
14. For roofing work, include in scope of work investigation and repair all soffits and fascia, and inspect for any openings that would allow pest access.
15. Utilize leaf guard type gutters.
16. Investigate suitability of "bird spikes" in areas where birds roost.
17. When work requires the opening of any void in the walls or behind cabinetry where pests can gain access, utilize ¼" galvanized steel cloth (rat wire) to cover opening, unless spec calls for a complete repair of hole.
18. Sort debris as per laws governing same. Remove as frequently as practical.

### 3.0 Construction

- A. Kick-Off Meeting. As part of the first site meeting review IPM requirements and current conditions
- B. Weekly Job Meetings. Track IPM issues weekly and include in report.
- C. Construction. Pay close attention to items effected by the work to the following:
  - 1. Seal all holes at openings caused by the work.
  - 2. Plug all holes at the end of the shift if work remains incomplete, in situations where the opening would allow pest access.
  - 3. Sort Debris as per laws governing same. Remove as frequently as practical.
- C. Close Out.
  - 1. Punch List: Pay special attention to unsealed openings in walls, floors, and ceilings
  - 2. Training of site staff for new landscape and other systems associated with the project.

End of Directive.

This represents the minimum of what the Project Manager should address. In terms of actual construction practices, certain areas of interest should also be highlighted.

#### Construction

This includes work done both with contractors on a Capital upgrade basis, as well as unit turnover done by Operations. Certain recurring problems and their solutions are worth highlighting at this point.

Radiators: The BHA has many buildings that use cast-iron radiators. They are difficult to work around during any sort of unit turnover, and as a result, the portion of the room in which they stand is usually in the poorest condition. Additionally, the fact that radiators emit moisture and require wall or floor penetrations make them attractive to pests and facilitate their access to other parts of the building. Cracked paint, rotted floors, and other structural issues remain unattended due to the difficulty of working around the radiator.



The solution is to remove the radiator and effect proper repairs. Damaged flooring can be replaced with marine plywood (where appropriate) and other issues addressed as needed.

Kitchens: Kitchens naturally draw pests because of the proximity of food and moisture. Cabinetry and appliances offer excellent harborage, while unsealed pipe chases and wall void offer other access. While appliances, strictly speaking are not 'structural' in nature, the owner can aid in pest control by specifying the use of wheeled appliances, and, where possible, use of electric stoves in lieu of gas. Electric stoves are easier and safer for residents to pull out and clean behind and under.

Cabinetry should have industrial-strength caulk applied at all joints, such as where the cabinet contacts the floor and walls. Wall voids should be covered with ¾" Rat Wire prior to the installation of cabinetry. In cases of known infestation, it may be beneficial to apply tracking powder or gel bait in voids as well.

Sinks should be given a heavy bead of water-proof industrial caulk under the lip prior to installation. Any caulk that 'oozes' out can be cleaned before it dries.

Counter tops should be one-piece, i.e., have an attached backsplash. Water that lies on the counter top inevitably infiltrates the joint between the counter top and backsplash.

#### Walls and Floors

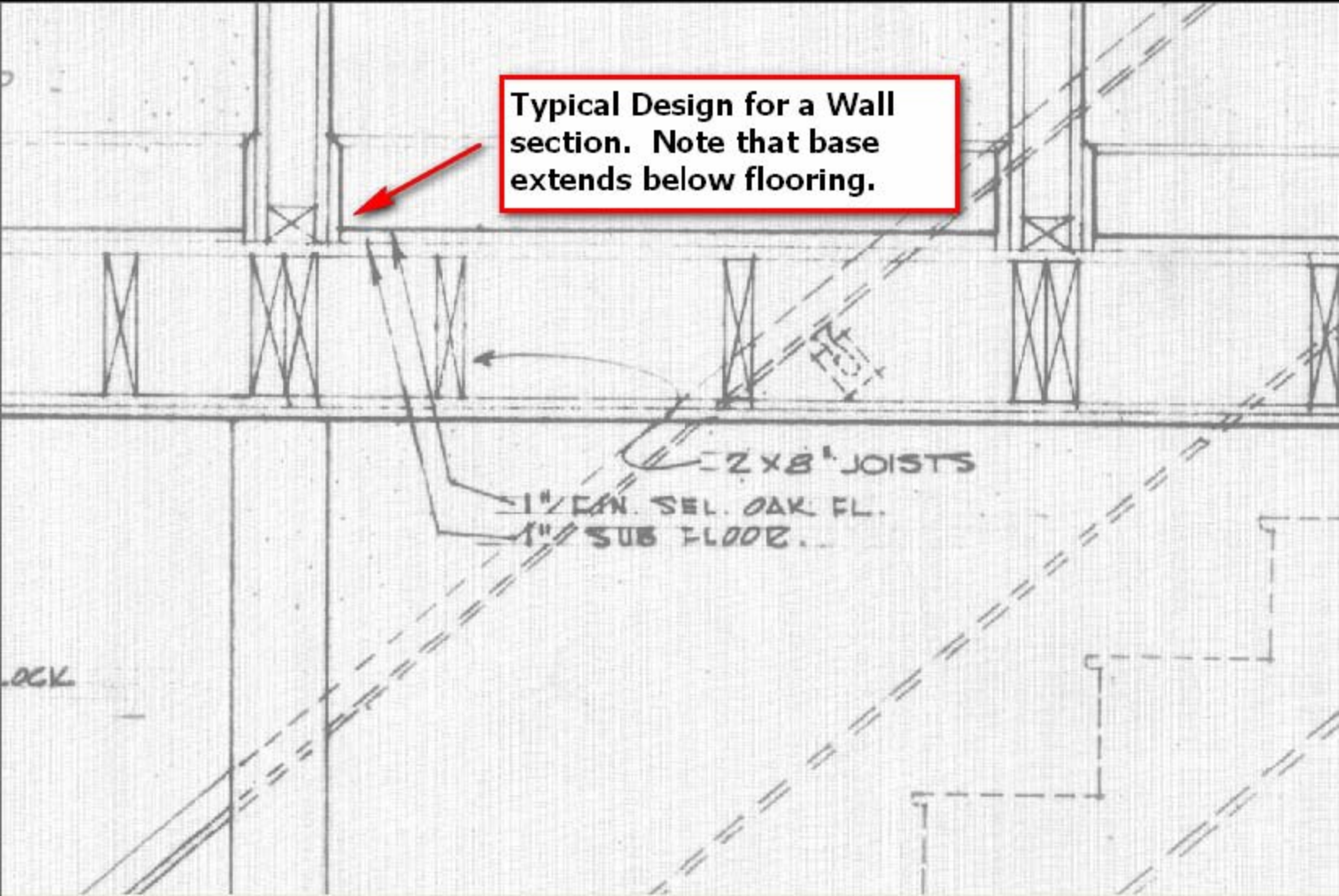
As noted previously, walls serve as a highway for pests, rather than an obstacle. The critical part is the joint where the wall meets the floor. In an internal wall made of wood and drywall, the bottom plate is not usually 100% 'tight' against the floor. Uneven floors and the natural bends in wood prevent this from being possible. Similarly, the drywall panels that are hung on the frame often have a gap along the bottom edge, creating an access point. All of this is usually concealed with cove base. This combination allows insects to migrate beneath walls.

Wherever possible, particularly along uneven floors, attempts should be made to seal that void. Cove base offers harborage, and should be replaced with straight base. In all cases, a tight seal is necessary.

#### Conclusions:

The details of the application of structural solutions to Integrated Pest Management are potentially endless, while generalizations do not always lend themselves to practical application. Therefore, we have attached the following photographs with labels indicating a specific problem and solution. It is hoped that this series of examples will serve to illustrate the thinking that goes into developing an effective plan to reduce pest problems in our buildings. The reader will notice that all problems and solutions involve the removing the requirements to support pest life: food, water, access, and harborage. Project managers and construction superintendents should both realize that this Guide and the information therein are suggestions only, and do not constitute absolute requirements. The practical applications should be handled on the basis of a cost/benefit analysis particular to the needs of each site, and the funding available for each project.

Typical Design for a Wall section. Note that base extends below flooring.



**Problem:** This is a cross section of a wall as actually installed, allowing for insect access and harborage.


**Solution:** Install correctly and inspect prior to acceptance of work.



**Wall Gap**

**Misaligned Stud**

**Sheet rock does not terminate at floor.**

A close-up photograph of a wooden bed frame. A white credit card is wedged into a gap between two wooden slats. The wood is a reddish-brown color. A text box with a red border is overlaid on the right side of the image.

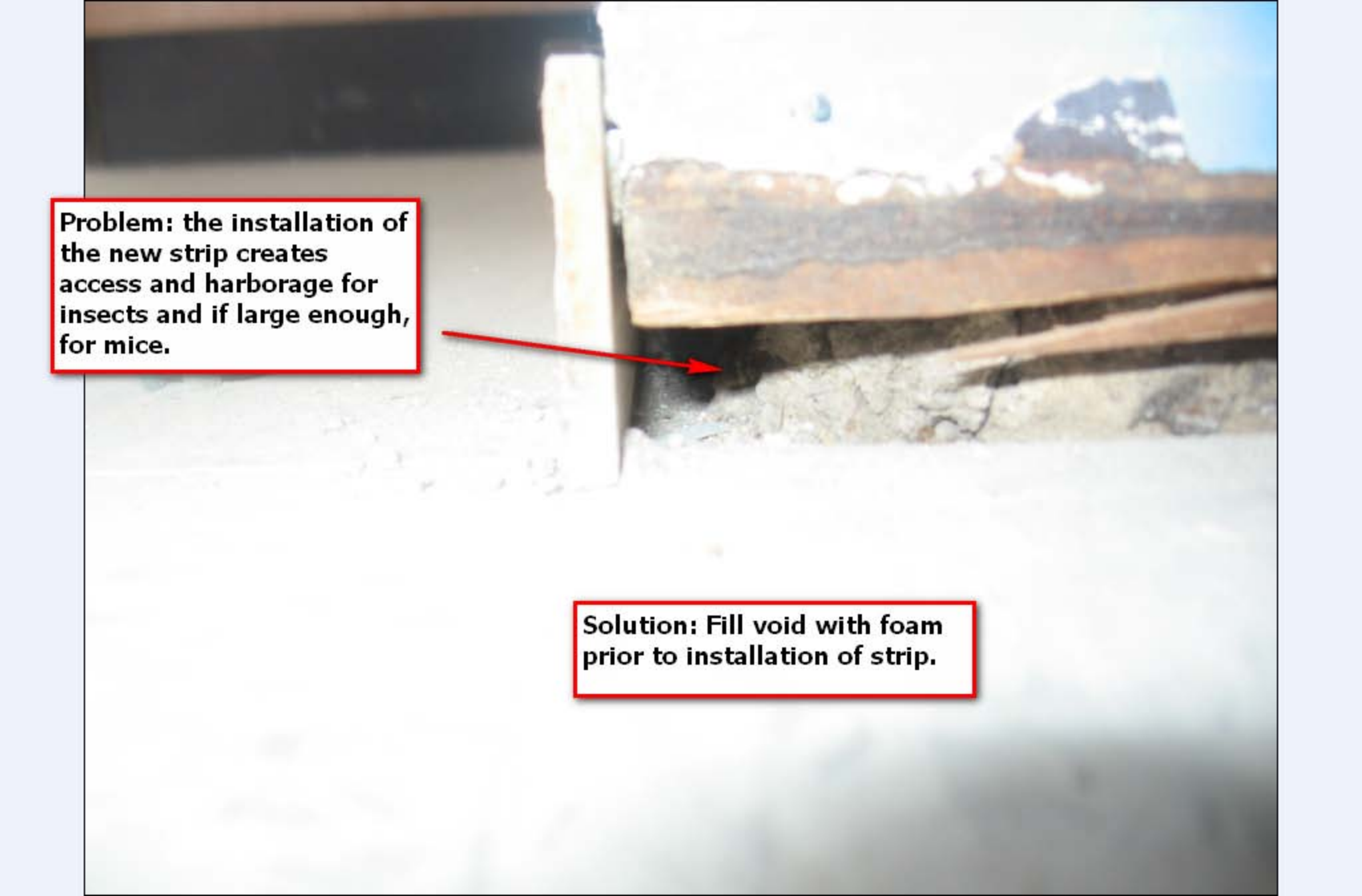
**Bedbugs can penetrate any gap larger than the thickness of a credit card.**

**At first glance, this wooden strip seals the old baseboard with the replacement tile floor.**



However, another view shows that the level of the floor has been dropped through the removal of a parquet floor. The result of this is a gap between the base and the floor.

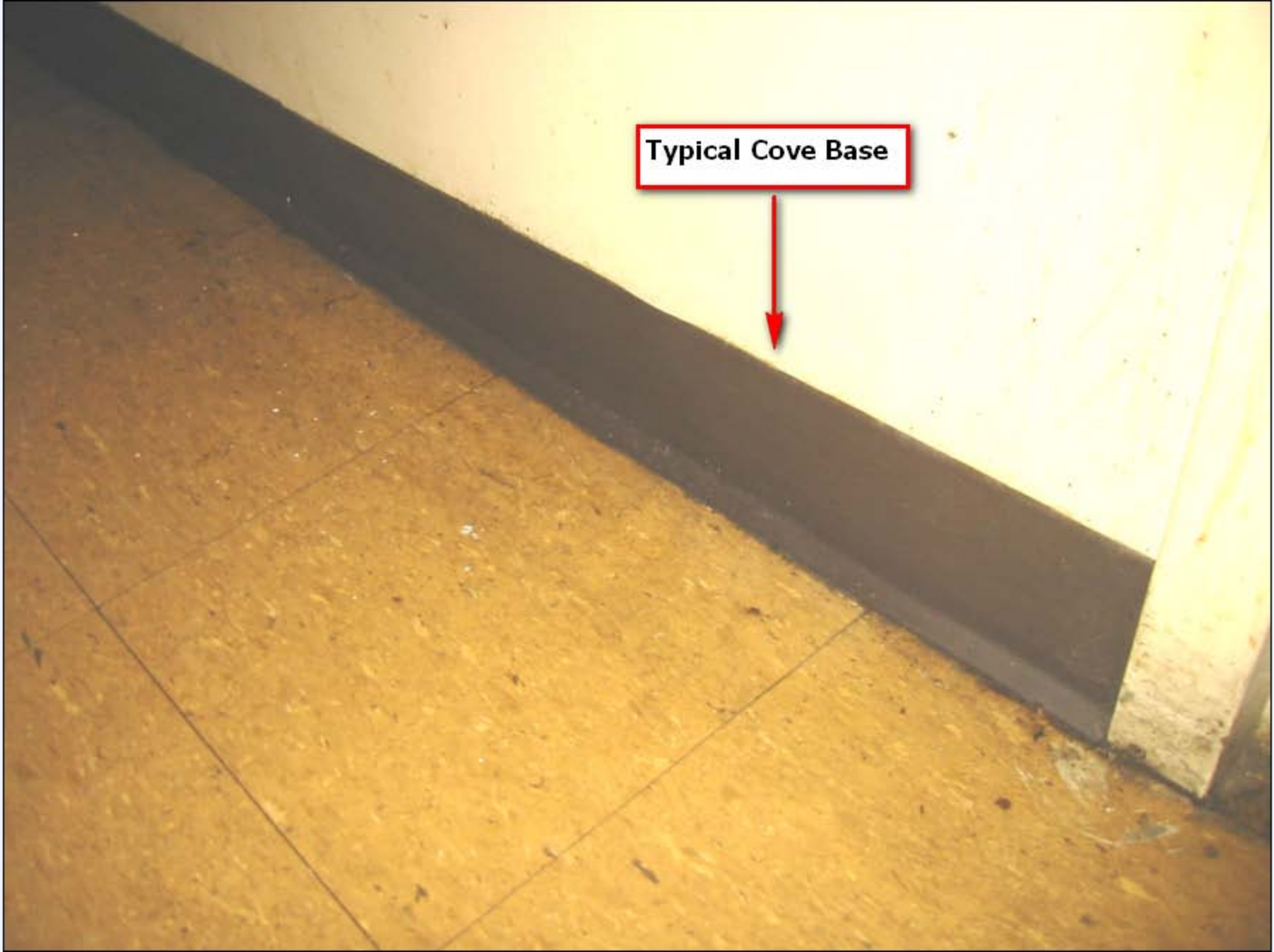


A close-up photograph showing a wooden strip being installed over a concrete wall. The strip is being placed over a gap in the wall. A red arrow points to the gap between the strip and the wall. The background shows a blurred outdoor scene with a blue sky and some distant structures.

**Problem: the installation of the new strip creates access and harborage for insects and if large enough, for mice.**

**Solution: Fill void with foam prior to installation of strip.**

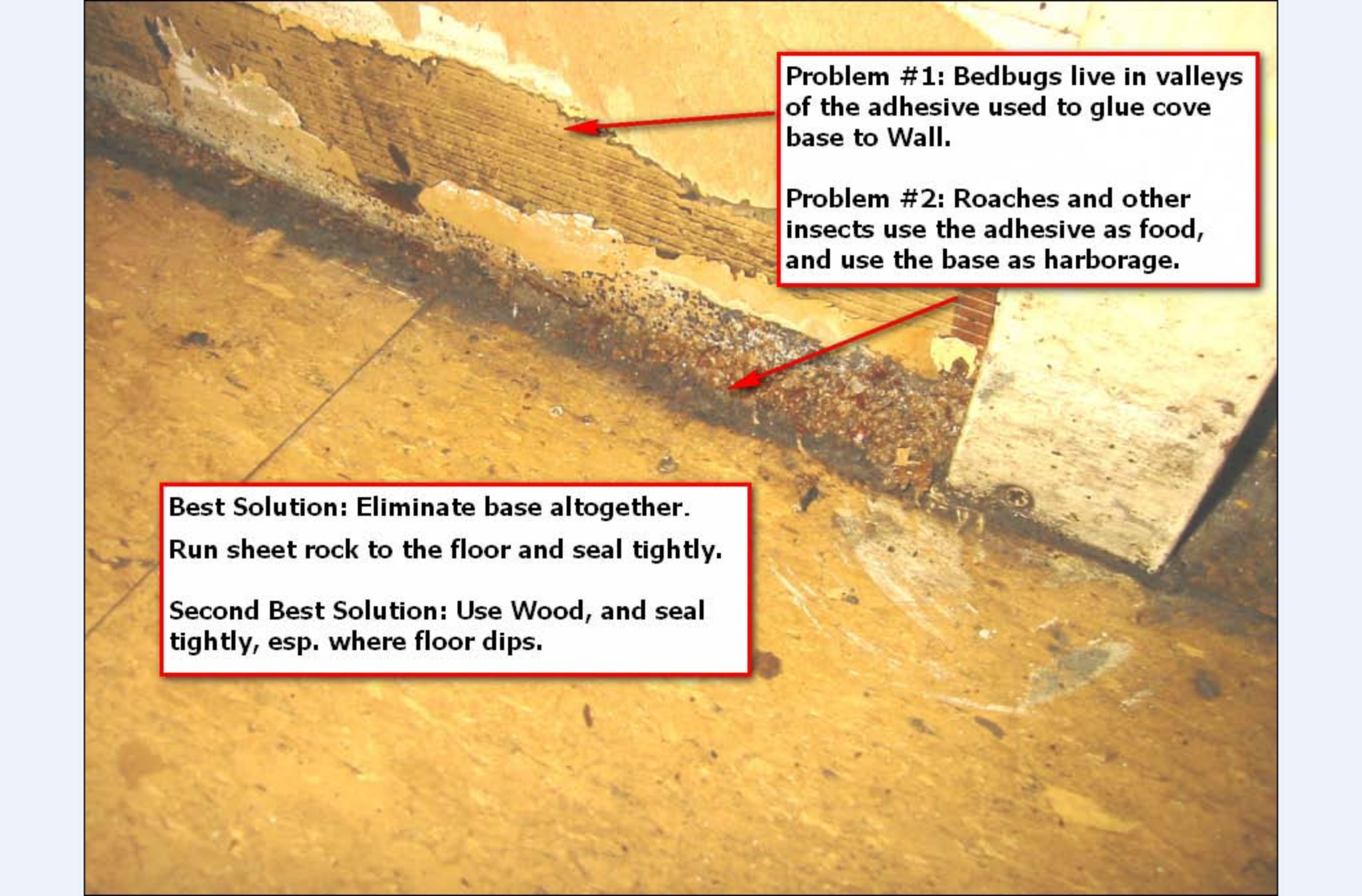
Typical Cove Base





**Cove base removed to show water damage and other deterioration.**





**Problem #1: Bedbugs live in valleys of the adhesive used to glue cove base to Wall.**


**Problem #2: Roaches and other insects use the adhesive as food, and use the base as harborage.**

**Best Solution: Eliminate base altogether.  
Run sheet rock to the floor and seal tightly.**

**Second Best Solution: Use Wood, and seal tightly, esp. where floor dips.**

**The gaps between this poorly installed cove base indicate deeper problems.**





**Problem: gap in wood backing gives pests access to wall cavity and other rooms.**


**Solution #1: Eliminate cove base and sheetrock to floor. Seal tightly.**

**Solution #2: Replace backing and install correctly, without gaps. Seal tightly and reinstall base.**



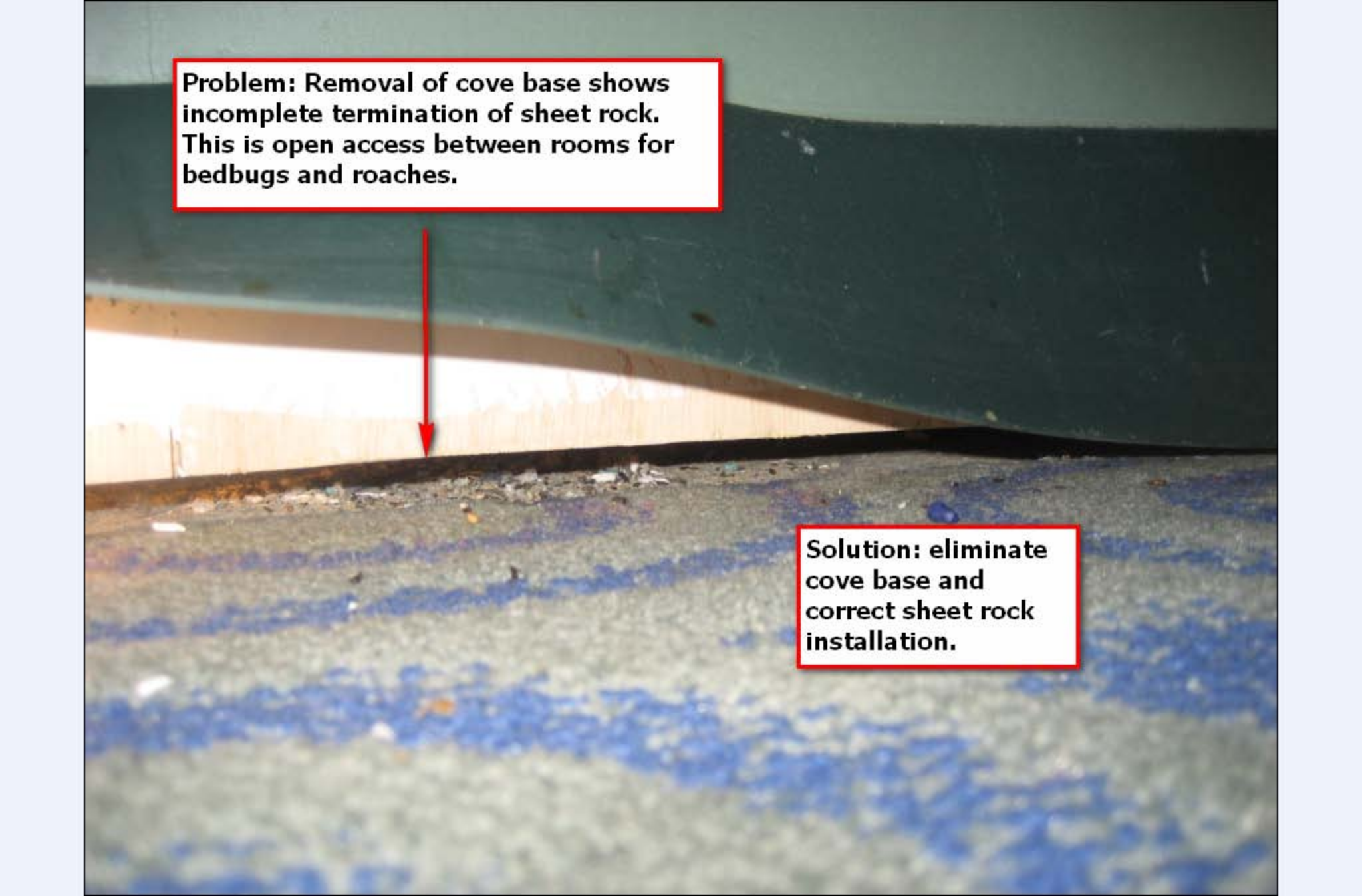
**Problem: Carpet cannot be tacked down underneath baseboard heat lines. Creates access and harborage**

**Solution: install and tightly seal a wooden strip below heat line. Then install carpet properly using tack strip next to wooden strip.**



**Problem:** poorly laid carpet and gap in cove base allows bedbug access to room.

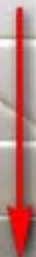
**Solution:** Remove carpet and cove base. Replace with correctly sealed sheet rock and tile.



**Problem: Removal of cove base shows incomplete termination of sheet rock. This is open access between rooms for bedbugs and roaches.**

**Solution: eliminate cove base and correct sheet rock installation.**

**Problem:** Incorrect use of floor tile as base tile allows water to settle on flat surface, and eventually penetrate behind the tile and pop them loose. This creates harborage and access for insects and a location of food for all pests.



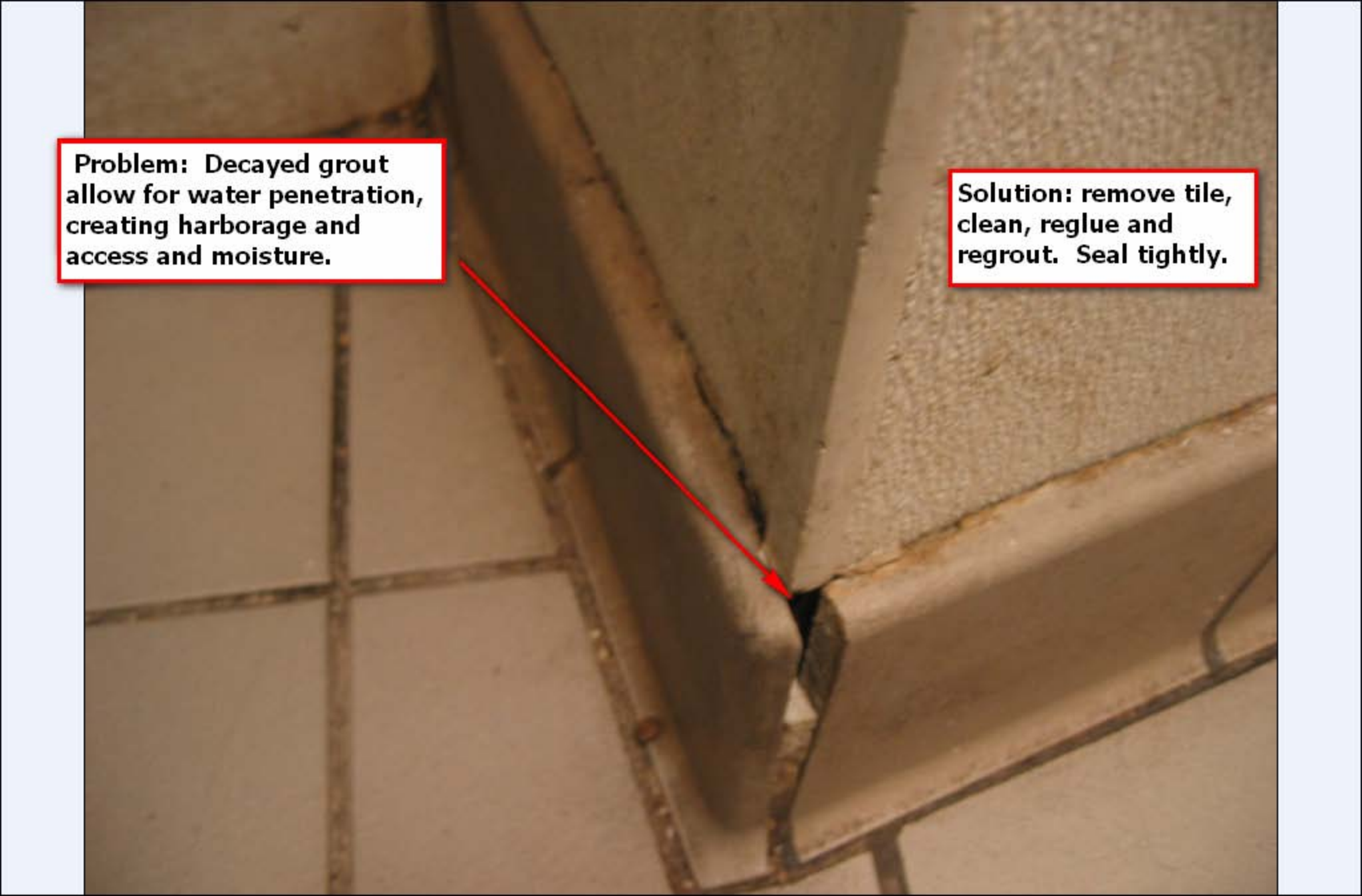
**Solution:** Use base tile with a rounded top to prevent water penetration behind tile. Seal tightly.



A close-up photograph of a floor tile joint. The tiles are reddish-brown and appear to be made of ceramic or stone. The grout is dark and appears to be missing or crumbling in the joint. A red arrow points to a small gap in the grout where a small amount of water is pooled. Several small, dark, worm-like larvae are visible in the water. The overall appearance is one of poor maintenance and potential health hazard.

**Problem: UngROUTed floor tile creates standing water. Note fly larvae.**

**Solution: Grout properly & seal.**



**Problem:** Decayed grout allow for water penetration, creating harborage and access and moisture.

**Solution:** remove tile, clean, reglue and regROUT. Seal tightly.

**Problem: Space behind carpet tack strip provides harborage for bedbugs.**



**Solution: In buildings with bedbug infestation, remove carpeting.**

**Radiators attract pests due to their warmth and the moisture they generate. Their location also hinders repair of floor cracks and create harborage.**



A close-up photograph of a white-painted radiator pipe at the base of a white wall. The floor is made of dark wood planks. There is a hole in the floor between the wall and the pipe. A red arrow points from a text box to this hole. In the foreground, a black circular radiator control knob is visible, partially obscuring the floor. The knob has the words 'OPEN' and 'CLOSE' embossed on it.

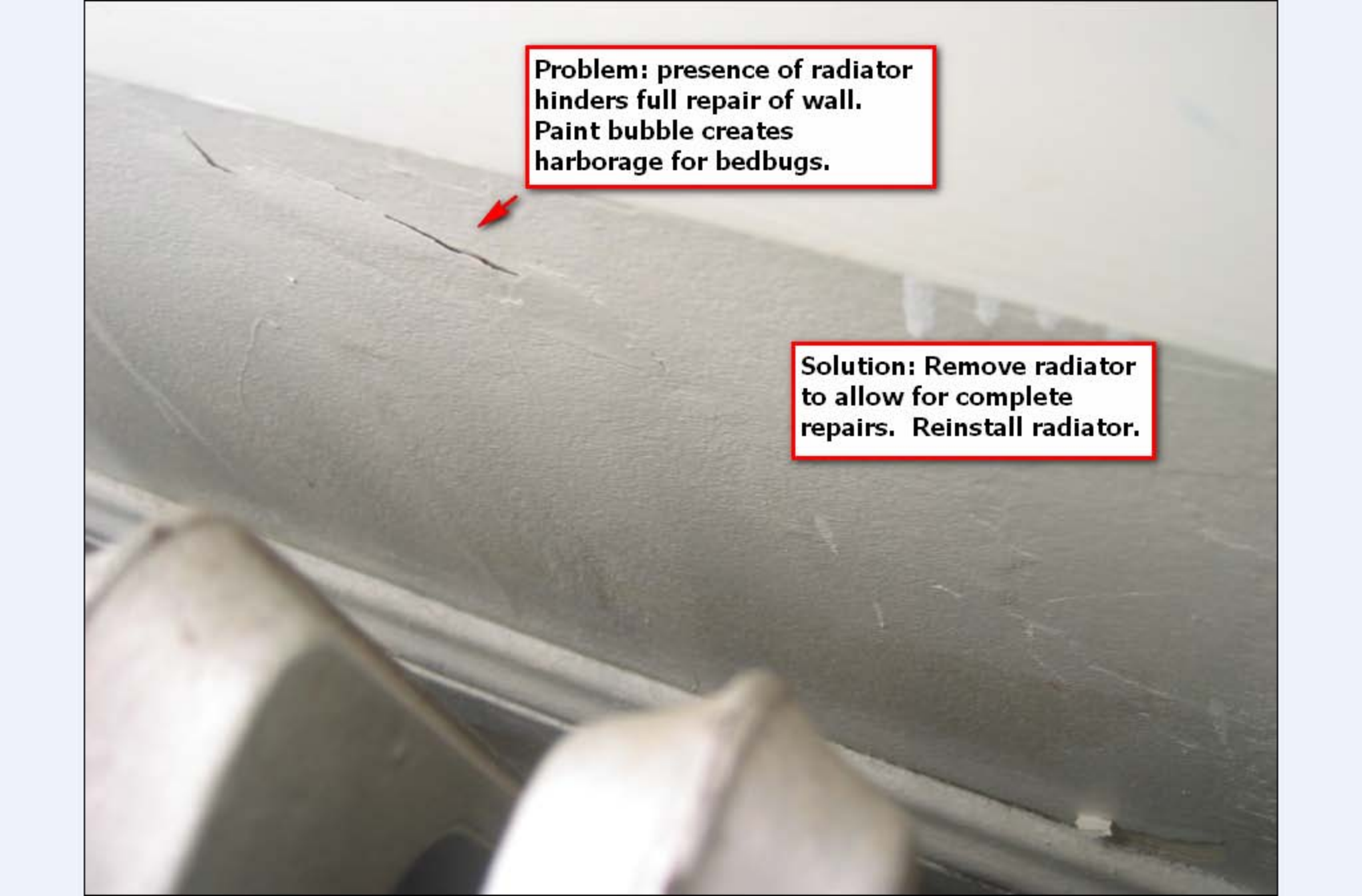
**Problem: Floor penetration and radiator conceal mouse hole.**

**Solution: Remove the radiator during repairs. Fill hole with copper wool and IPM foam prior to reinstalling the radiator.**

A close-up photograph showing a hole in a wooden floor. The hole is dark and appears to be a cavity where the wood has been eaten away. A red arrow points from the text box to the hole. The surrounding wood is light-colored and shows signs of wear and discoloration. A radiator is visible in the background, partially obscured by the floor.

**Problem: Carpeting concealed floor rot under radiator. Hole creates access and harborage.**

**Solution: Remove radiator and cut out damaged portion of floor . Replace with 3/4" Marine plywood under radiator. Replace radiator.**

A close-up photograph of a wall with a greyish, textured surface. A red arrow points to a small, irregularly shaped paint bubble or crack. The bubble is located near the top edge of the wall, where it meets a white ceiling. The wall shows signs of wear, including some faint scratches and discoloration. The overall lighting is somewhat dim, highlighting the texture of the wall and the white ceiling.

**Problem: presence of radiator  
hinders full repair of wall.  
Paint bubble creates  
harborage for bedbugs.**

**Solution: Remove radiator  
to allow for complete  
repairs. Reinstall radiator.**

**Problem #1: use of a separate backsplash allows water penetration**



**Solutions: Use a one-piece countertop and backsplash. Caulk under sink during installation**

**Problem #2: Failure to caulk under edge of sink allows water penetration**



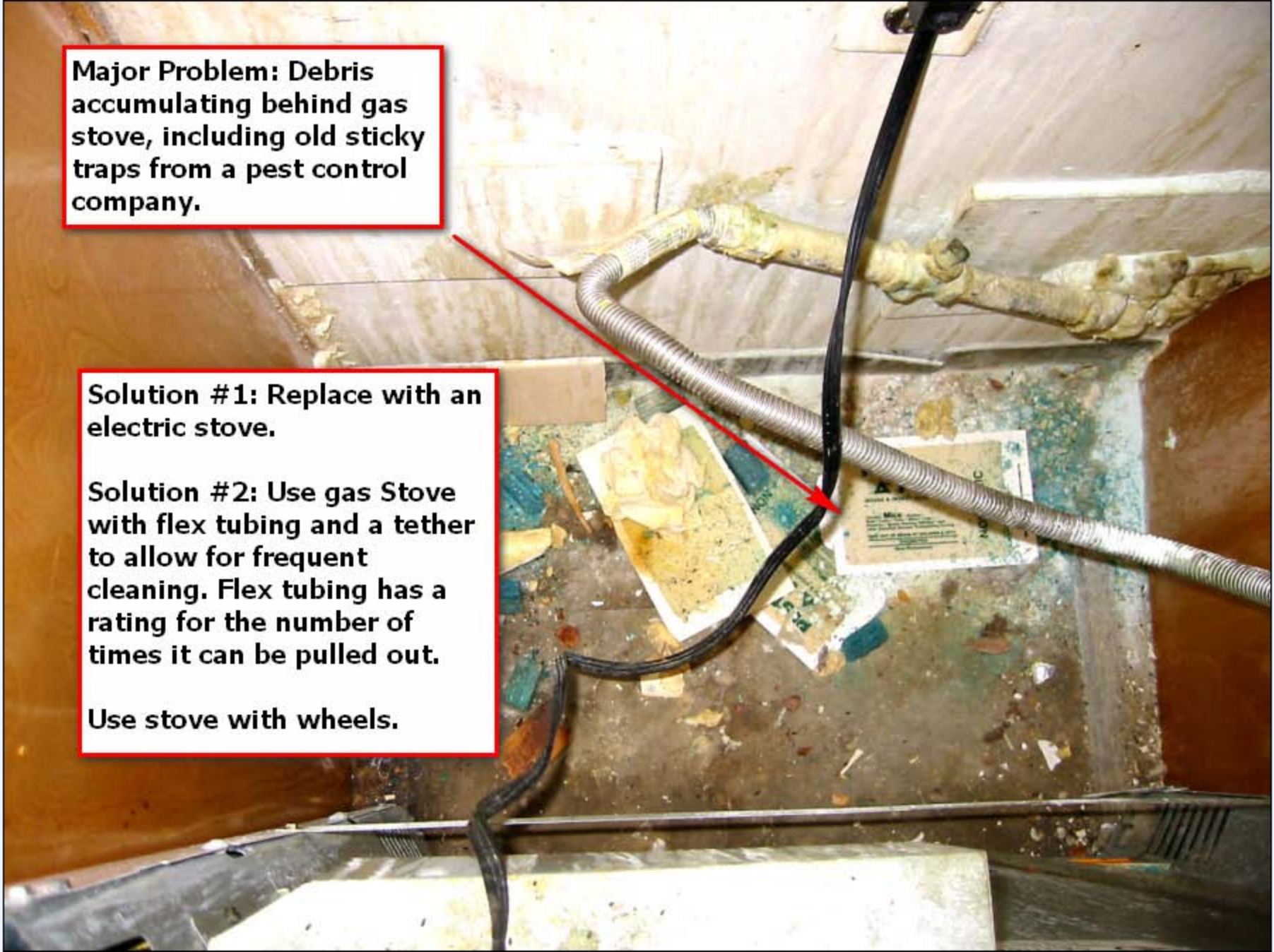


**Major Problem: Debris accumulating behind gas stove, including old sticky traps from a pest control company.**

**Solution #1: Replace with an electric stove.**

**Solution #2: Use gas Stove with flex tubing and a tether to allow for frequent cleaning. Flex tubing has a rating for the number of times it can be pulled out.**

**Use stove with wheels.**





**Problem:** Debris accumulated behind a refrigerator. Heat from motor attracts pests, as does condensate from drip pan.

**Solution:** Specify refrigerators with wheels to allow periodic cleaning.

**Problem: Clutter, construction debris, and discarded materials provide harborage and conceal other potential problems.**

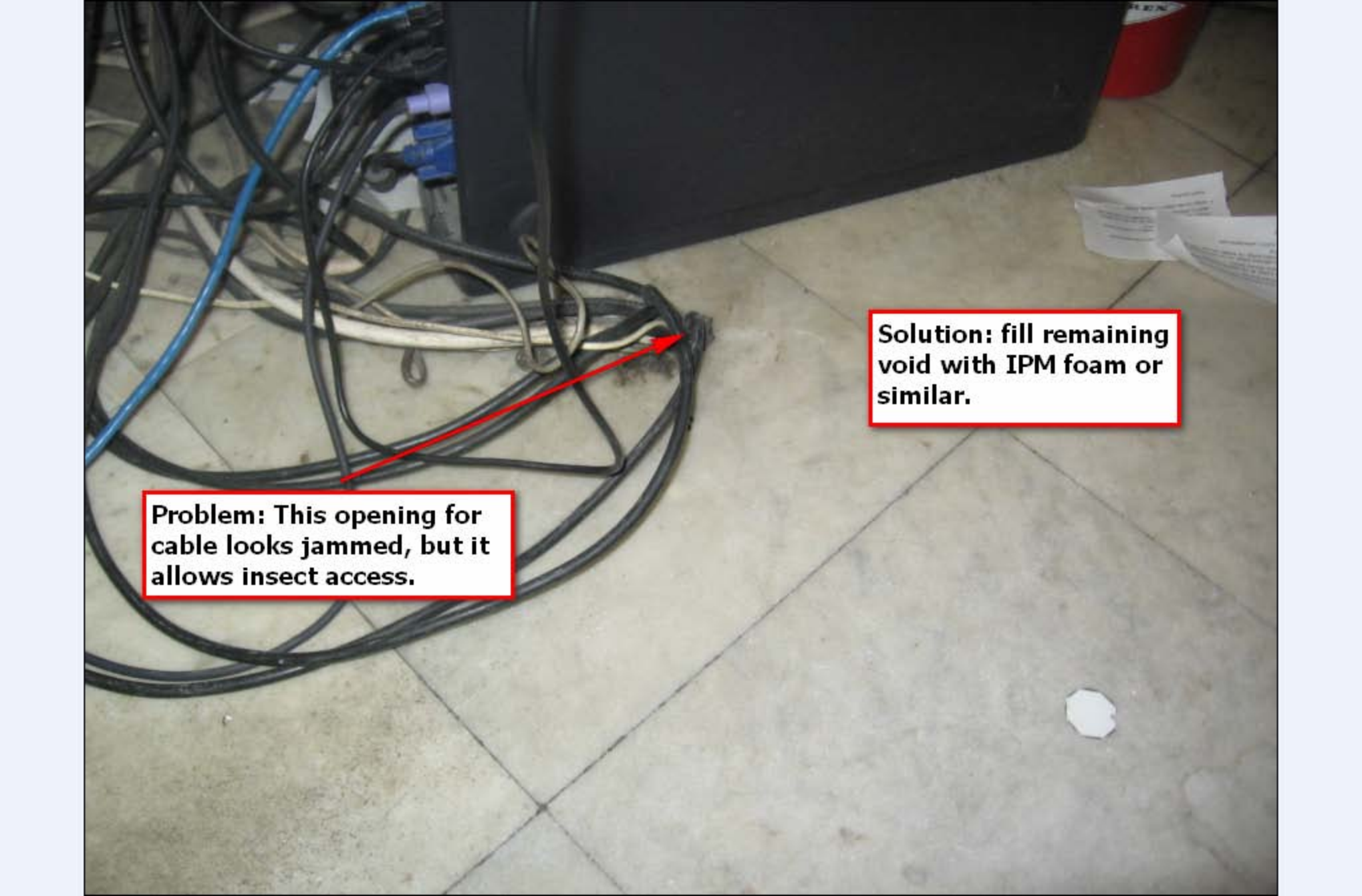
**Solution: CLEAN!**



**Problem: a gap between a new fixture and the back box will allow pest access.**

**Solution: Caulk around perimeter of a new fixture or install a gasket to seal.**



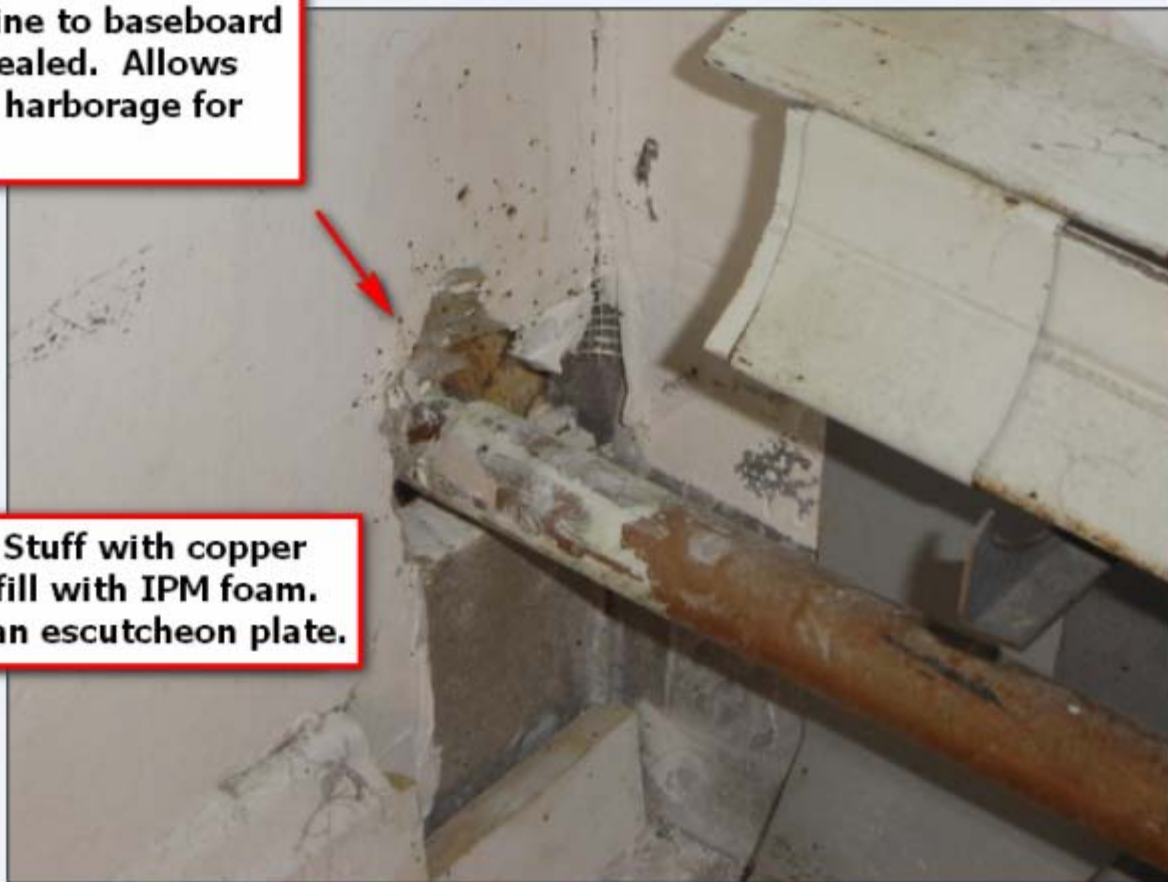


**Problem: This opening for cable looks jammed, but it allows insect access.**

**Solution: fill remaining void with IPM foam or similar.**

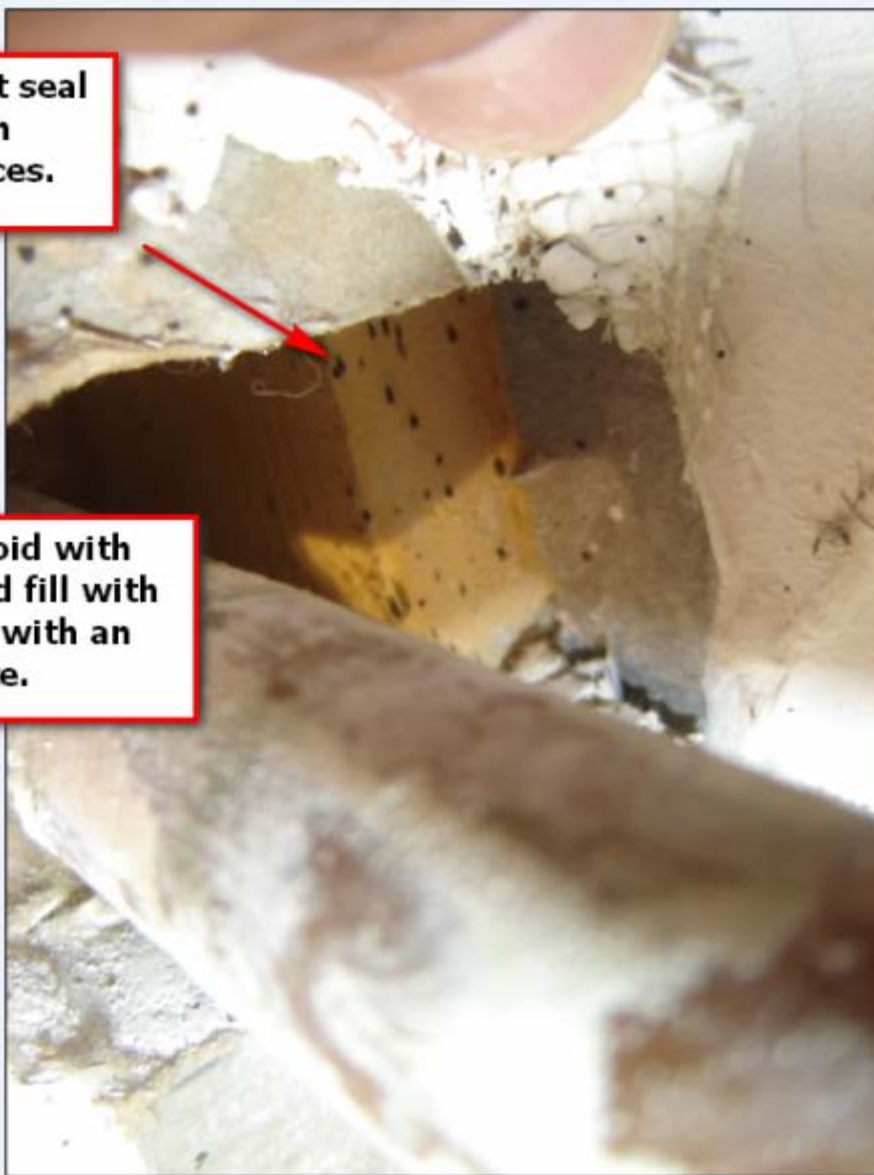
**Problem:** Wall penetration of copper line to baseboard heat is unsealed. Allows access and harborage for pests.

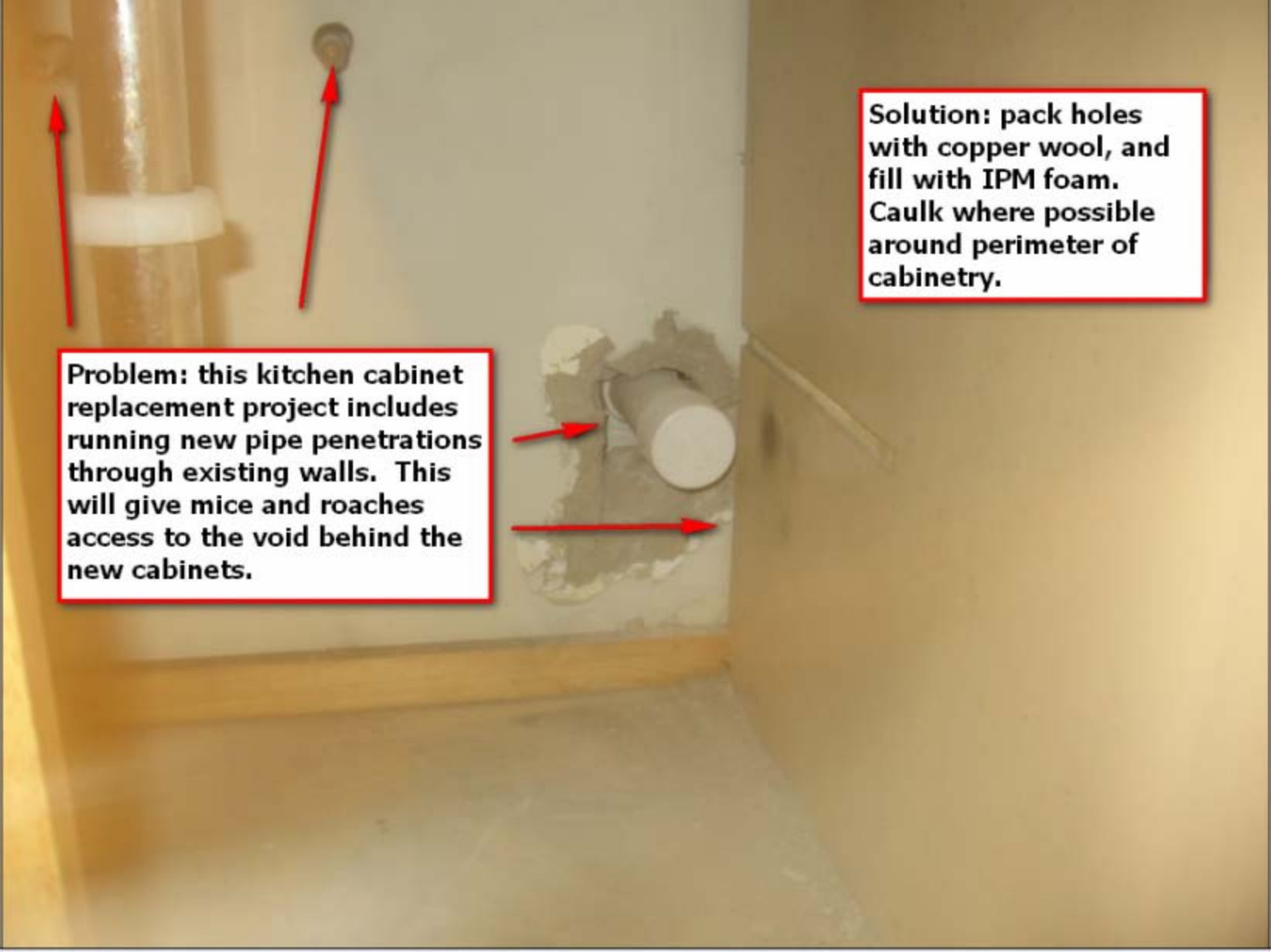
**Solution:** Stuff with copper wool and fill with IPM foam. Cap with an escutcheon plate.



**Problem: Incorrect seal of wall penetration reveals bedbug feces.**

**Solution: Fill void with copper wool and fill with IPM foam. Cap with an escutcheon plate.**



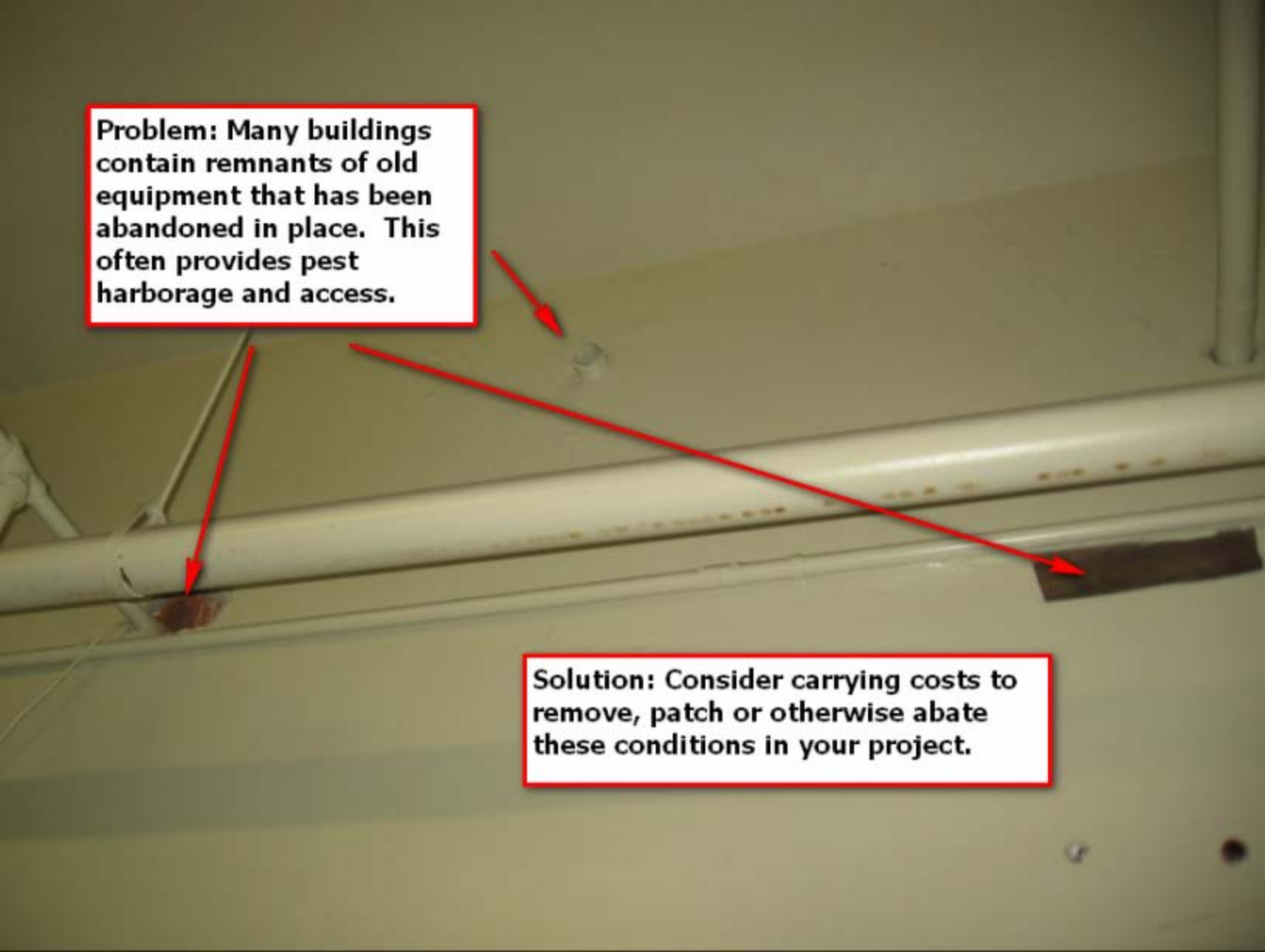


**Problem:** this kitchen cabinet replacement project includes running new pipe penetrations through existing walls. This will give mice and roaches access to the void behind the new cabinets.

**Solution:** pack holes with copper wool, and fill with IPM foam. Caulk where possible around perimeter of cabinetry.



**Problem:** Many buildings contain remnants of old equipment that has been abandoned in place. This often provides pest harborage and access.

A photograph of a ceiling area with white pipes and a dark rectangular object. Red arrows point from text boxes to these features. One arrow points from the top-left box to a small hole in the ceiling. Another arrow points from the same box to a hole in a pipe. A third arrow points from the bottom-right box to the dark rectangular object. A fourth arrow points from the bottom-right box to a hole in the ceiling.

**Solution:** Consider carrying costs to remove, patch or otherwise abate these conditions in your project.

**Problem:** An open pipe chase allows easy access to the kitchen from the basement.




**Solution:** Remove the cabinetry and install rat wire *behind* the cabinets, down to the floor and reinstall the cabinets.

**Problem: floor penetration not properly sealed. Concealed by carpet and escutcheon plates.**


**Solution: Use copper wool to plug the hole. Fill with IPM foam and cap with an escutcheon plate**



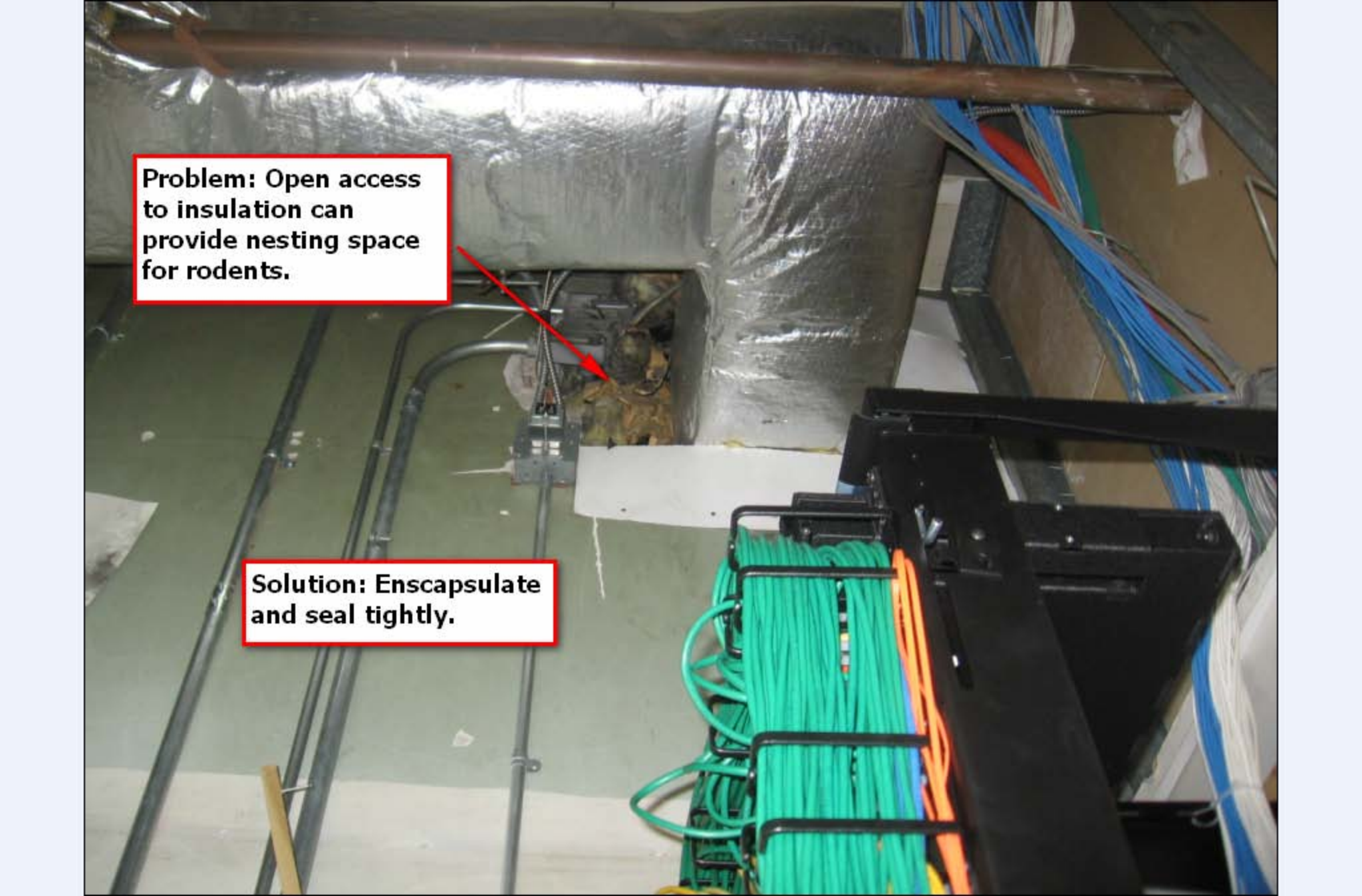


**Problem: Open or incomplete ductwork provides easy access for rodents to much of the building.**

**Solution: Reconnect or cap open ductwork.**



**This is the same duct  
line from another  
angle.**



**Problem: Open access to insulation can provide nesting space for rodents.**

**Solution: Encapsulate and seal tightly.**



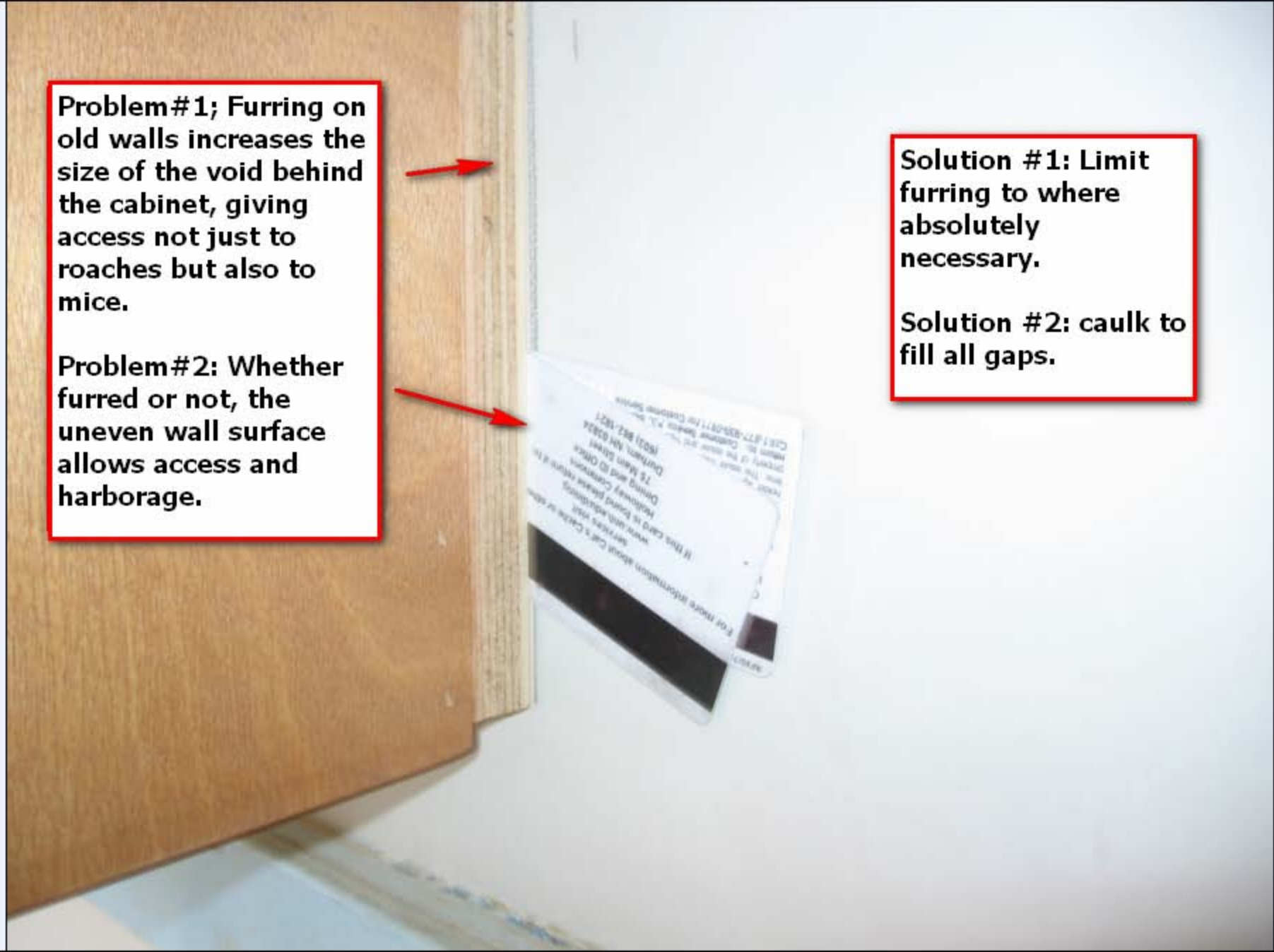
**This is a new pipe chase installed in an old building. To properly seal the chase between floor, concrete should be parged in, as shown above, prior to the installation of new walls. When the walls are installed, a bead of industrial caulk should be applied to perimeter.**

**Problem #1; Furring on old walls increases the size of the void behind the cabinet, giving access not just to roaches but also to mice.**

**Problem #2: Whether furred or not, the uneven wall surface allows access and harborage.**

**Solution #1: Limit furring to where absolutely necessary.**

**Solution #2: caulk to fill all gaps.**





**Problem: Gaps between Cabinets allow access to void behind Cabinets and potentially into any wall cavities behind cabinets.**

**Solution: Fill gap with IPM foam, allow to dry & trim.**



**Problem: Particle board creates excellent harborage for Bedbugs.**



**Solution: Don't use particle board.**



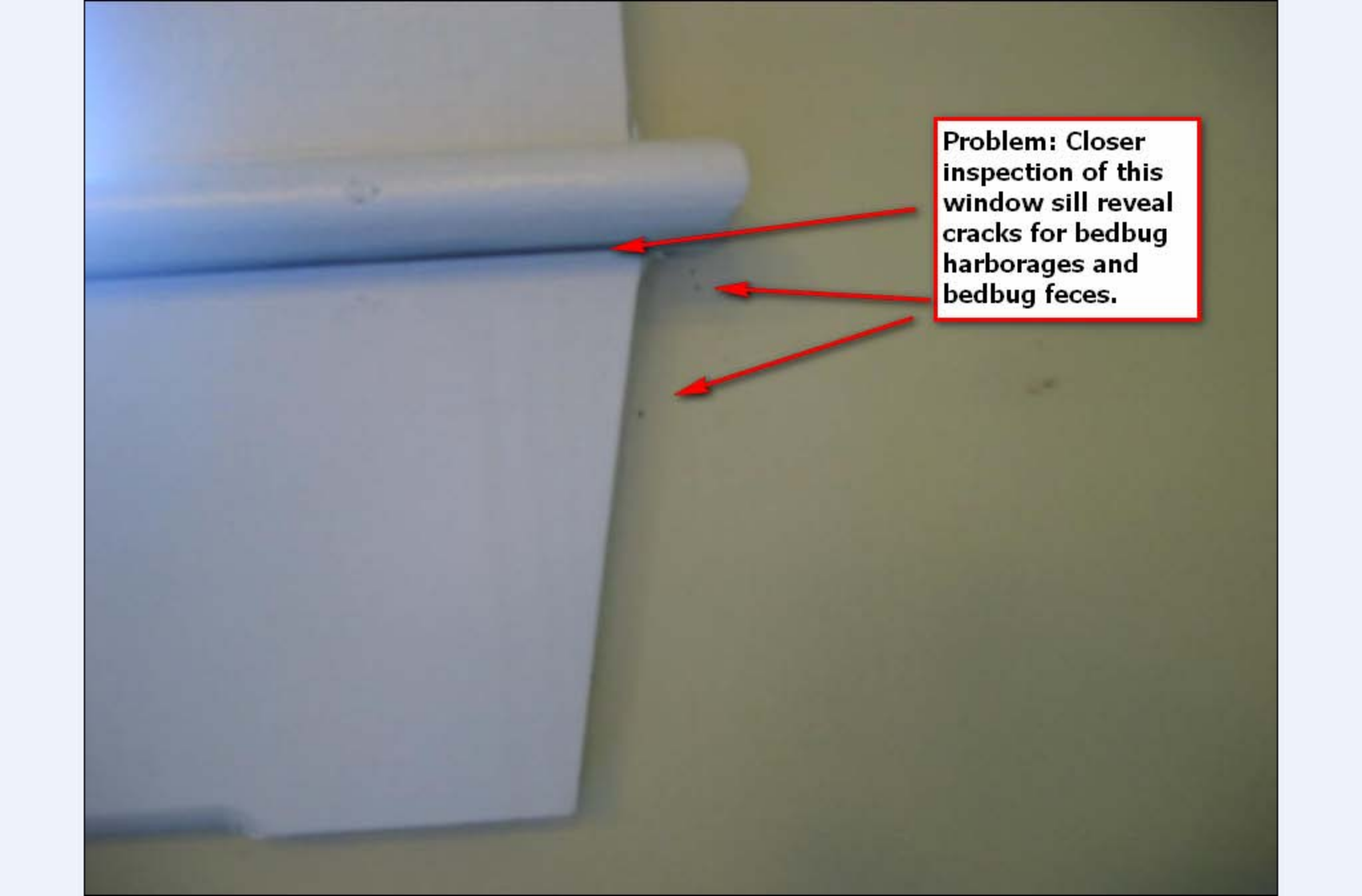
**Problem: Wood base can warp, creating harborage and access.**

**Solution #1: Eliminate base and run sheetrock to floor. Seal tightly.**

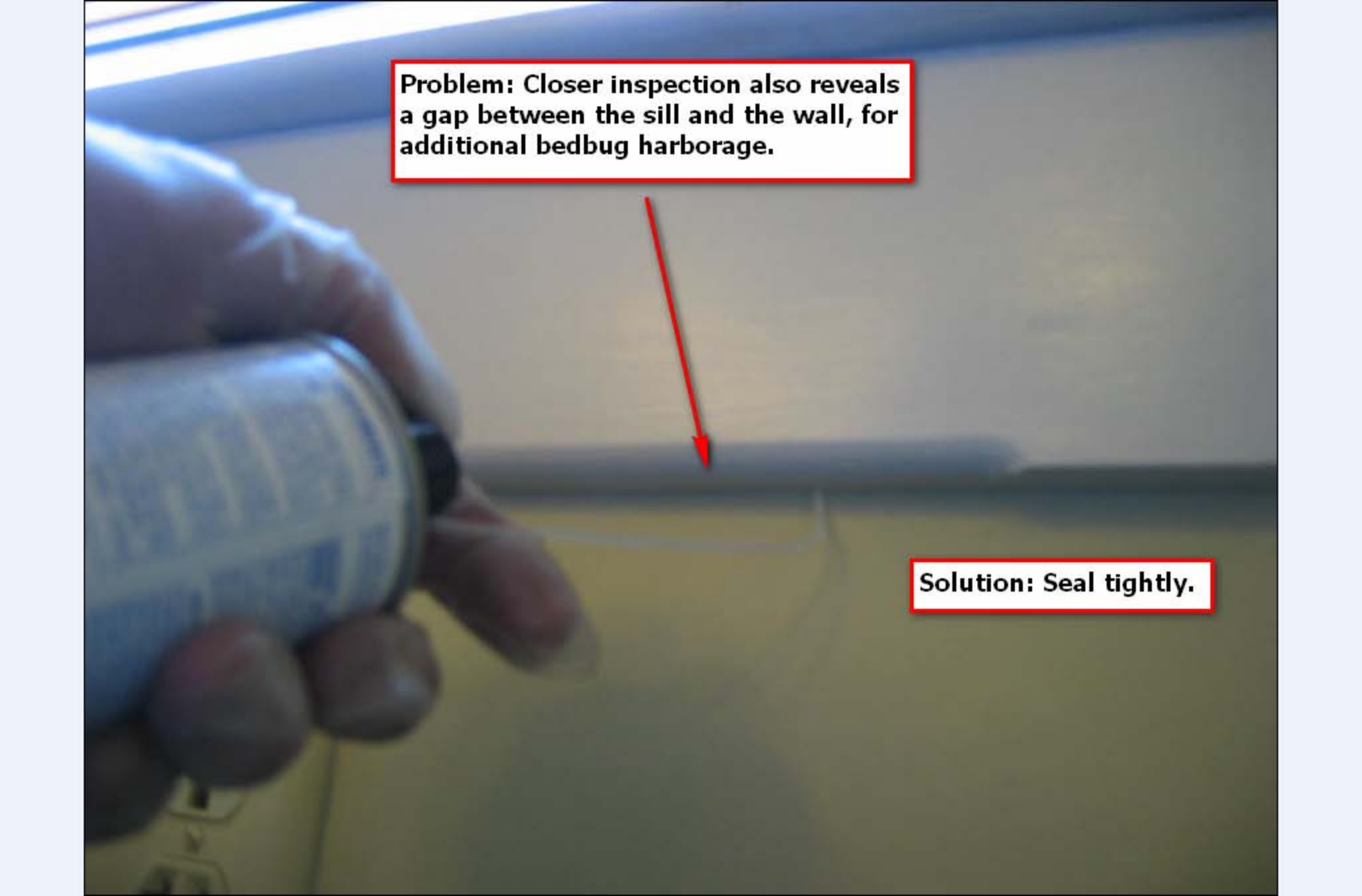
**Solution#2: Caulk and seal base.**

**A first glance there is nothing wrong with this window sill next to the bed.**






**Problem: Closer inspection of this window sill reveal cracks for bedbug harborages and bedbug feces.**

A hand is holding a white spray can on the left side of the frame. A red arrow points from a text box at the top to a gap between a window sill and the wall. The background is a plain, light-colored wall.

**Problem: Closer inspection also reveals a gap between the sill and the wall, for additional bedbug harborage.**

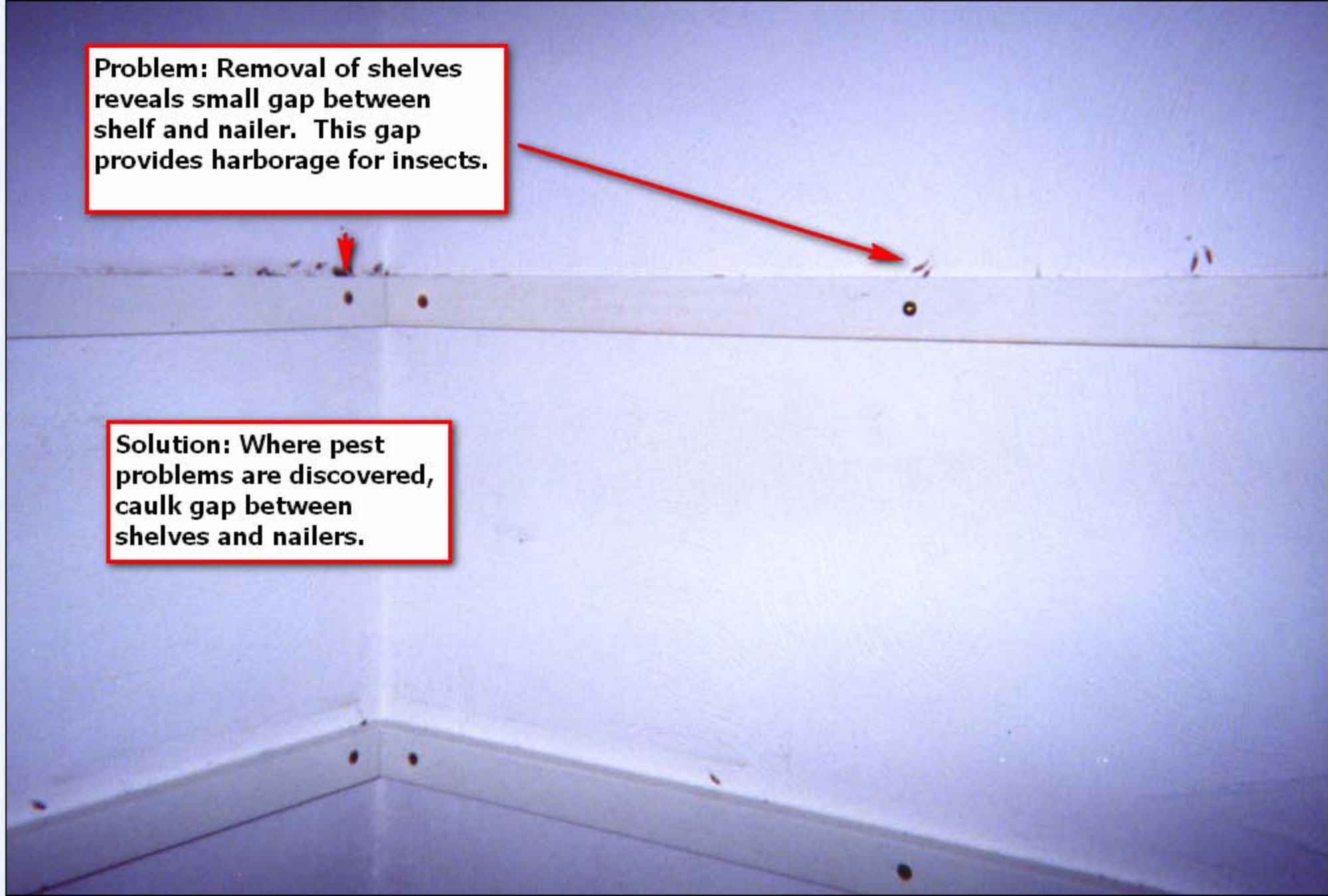
**Solution: Seal tightly.**



**At first glance, this set of closet shelves presents no pest control issues.**

**Problem:** Removal of shelves reveals small gap between shelf and nailer. This gap provides harborage for insects.


**Solution:** Where pest problems are discovered, caulk gap between shelves and nailers.





**This door frame appears to present no pest control issues from normal vantage points.**





**Problem: A slight bow in wall creates access to this hollow door frame, and harborage for insects.**

**Solution: Seal tightly.**



**Problem: Unsealed crown molding creates access points and harborage**

**Solution# 1: Eliminate crown molding.**

**Solution #2: Seal tightly**

**Problem: Plaster and paint cracks near this wall outlet create harborage for bedbugs.**



**Solution: Scrape, replaster and repaint. Use gasket behind plate cover.**



**Problem: Open Chase  
allows easy access  
from basement .**

**Solution: Fill void  
with IPM foam. Trim  
with putty knife when  
dry. Re-tile if possible.**



**Problem: Missing outlet cover provide easy access.**

**Solution: Replace cover and use a gasket.**



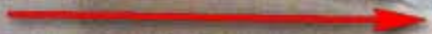


**Solution: Repair & Seal**

**Problem: Missing covers attract rodents, who are attracted to the heat of motors.**

**Problem: Switch plate and outlet covers that don't fit snugly on wall allow access to roaches and bedbugs**

**Solution: Install gasket behind cover.**

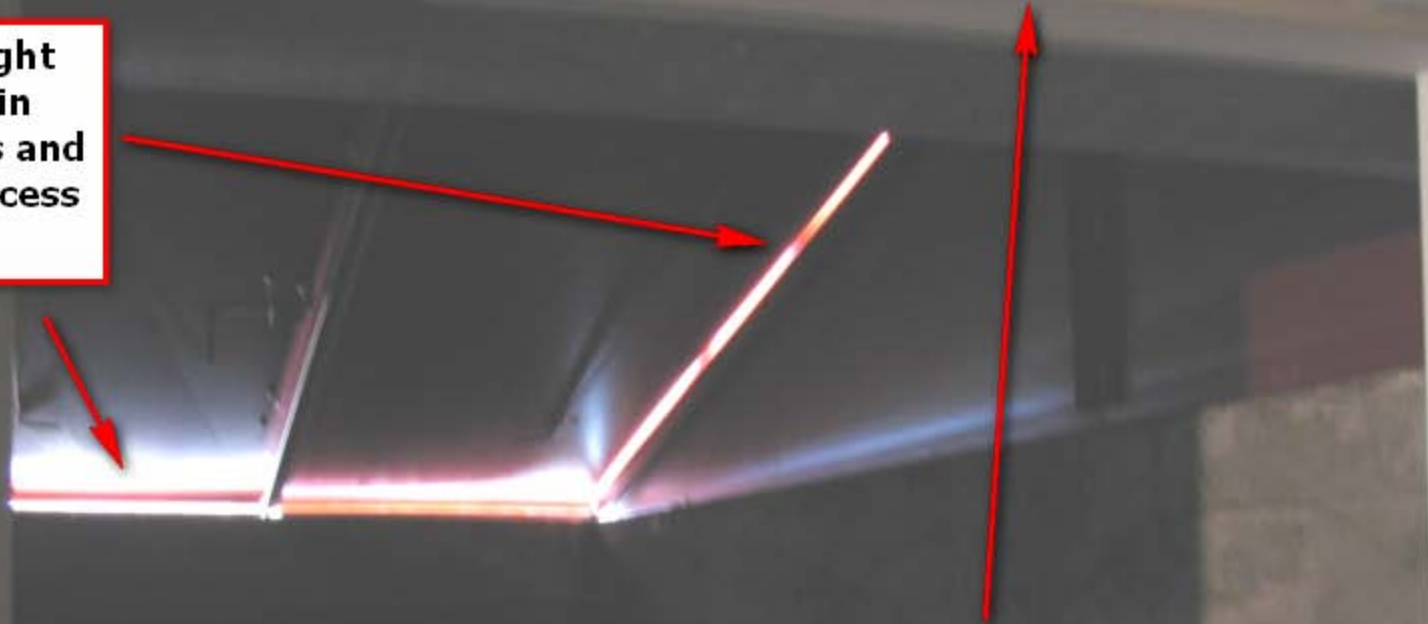




**From the exterior, this newly-installed bulkhead seems properly installed.**



**Problem: Daylight indicates gaps in bulkhead doors and frame. Easy access for pests.**

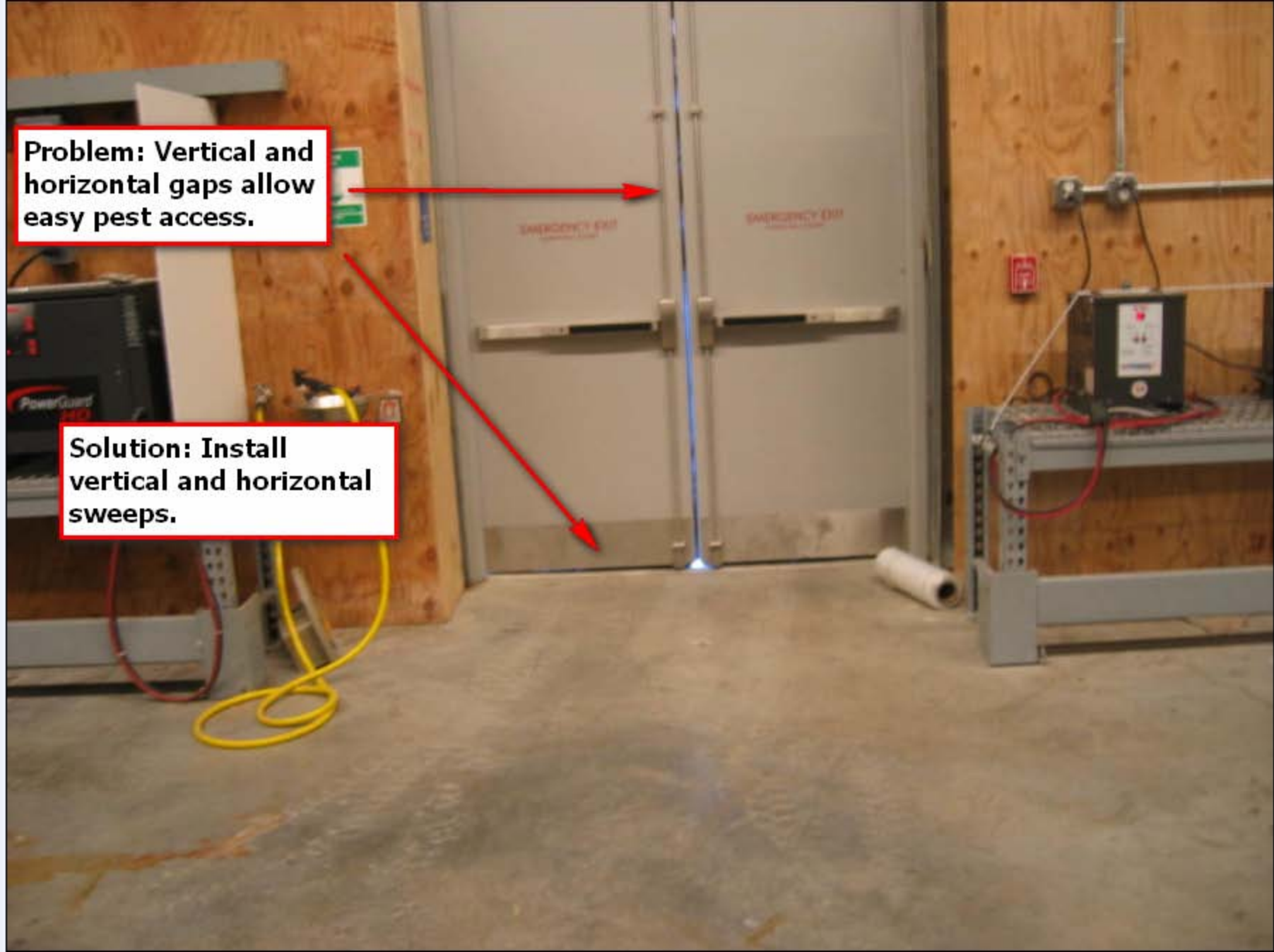


**Solution: Install a tight interior door on basement**



**Problem: Vertical and horizontal gaps allow easy pest access.**

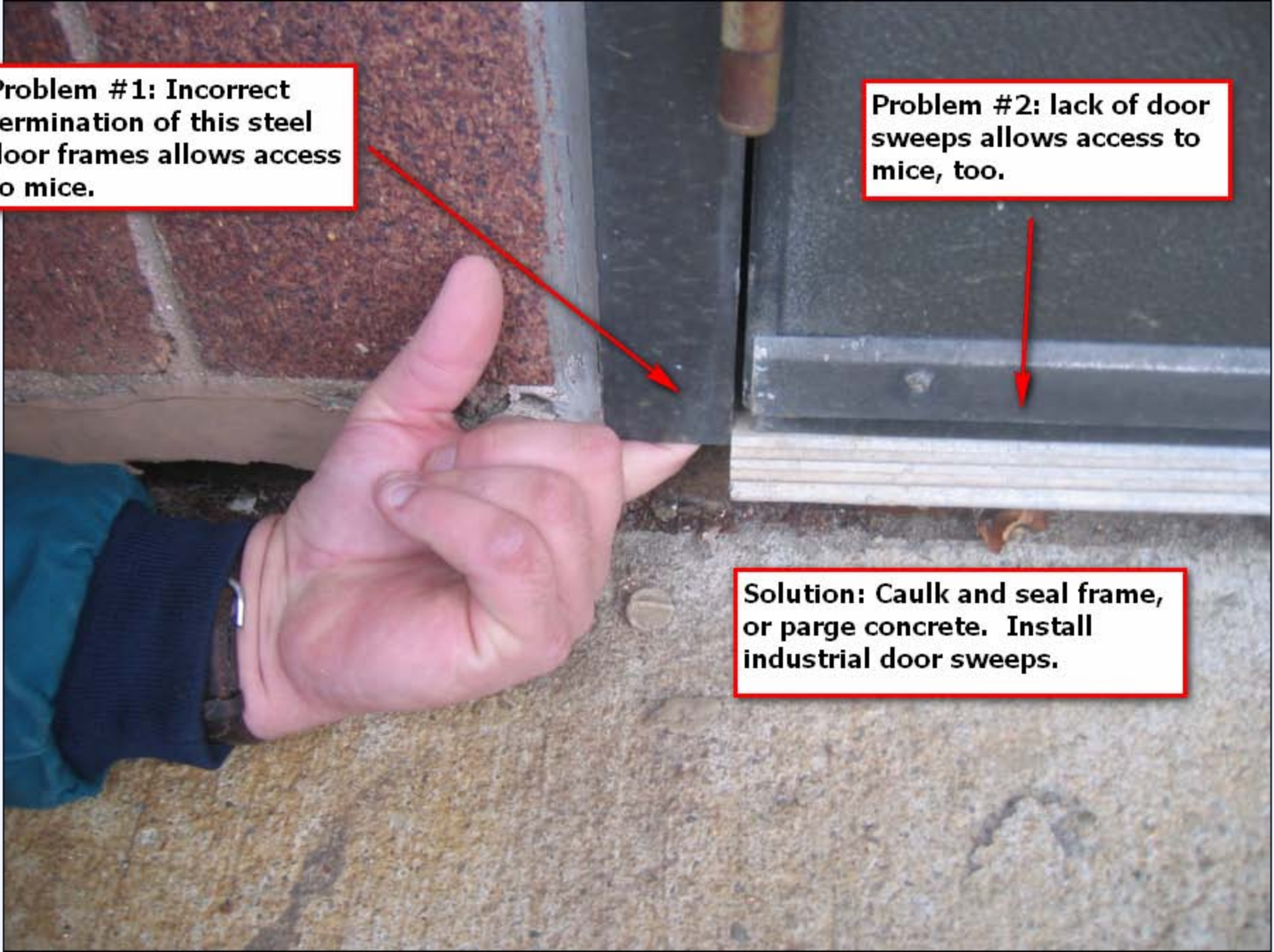
**Solution: Install vertical and horizontal sweeps.**



**Problem #1: Incorrect termination of this steel door frames allows access to mice.**

**Problem #2: lack of door sweeps allows access to mice, too.**

**Solution: Caulk and seal frame, or parge concrete. Install industrial door sweeps.**



**Problem: An opening in this knock-down frame allows pests to gain access to the void between the inner and outer walls.**



**Solution: Use a plug or fill with foam.**



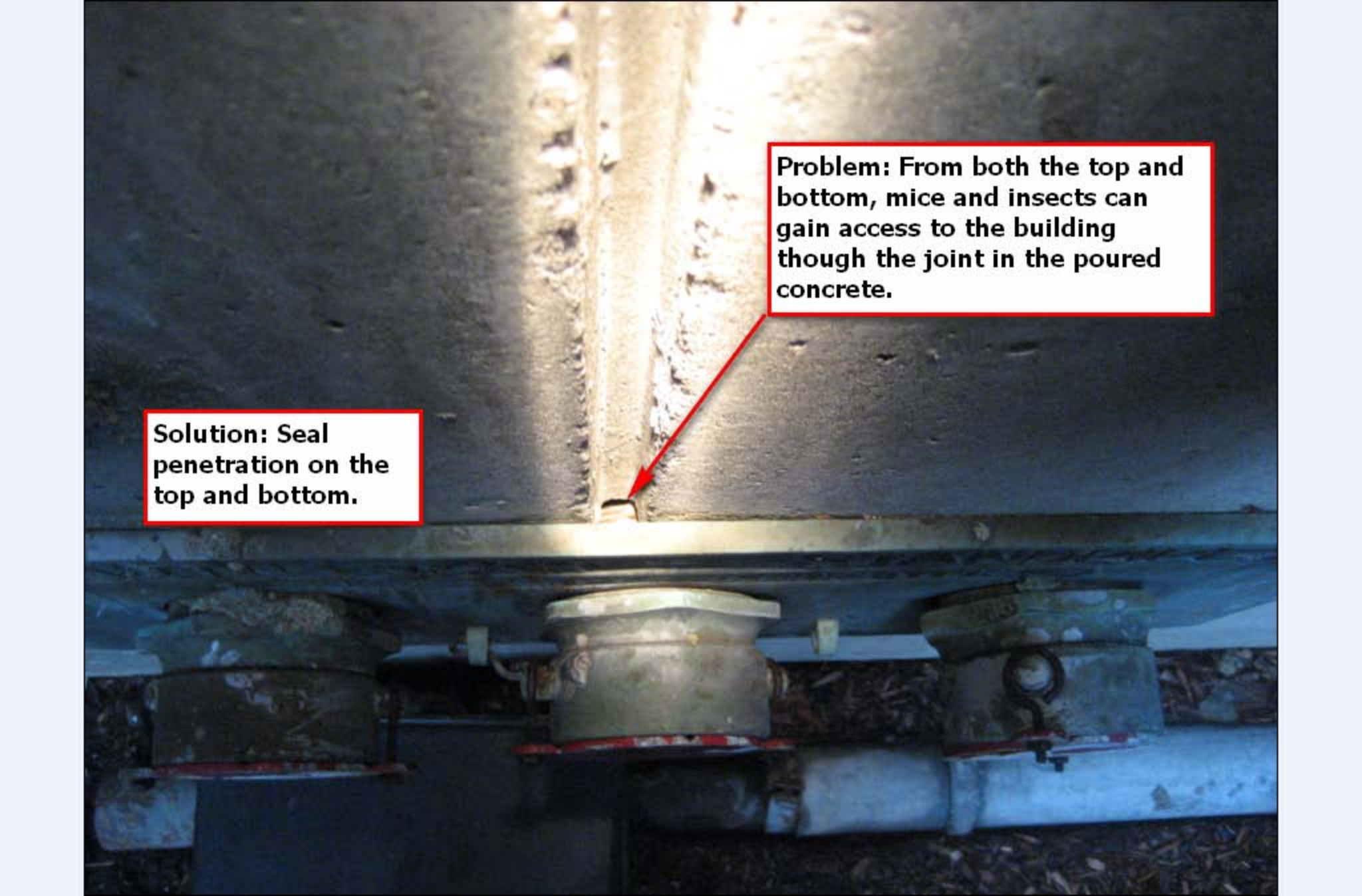
**Problem:** Threshold has eroded, allowing easy pest access. Sweeps alone will not work.

**Solution:** repair concrete and diamond plate threshold; install sweeps.





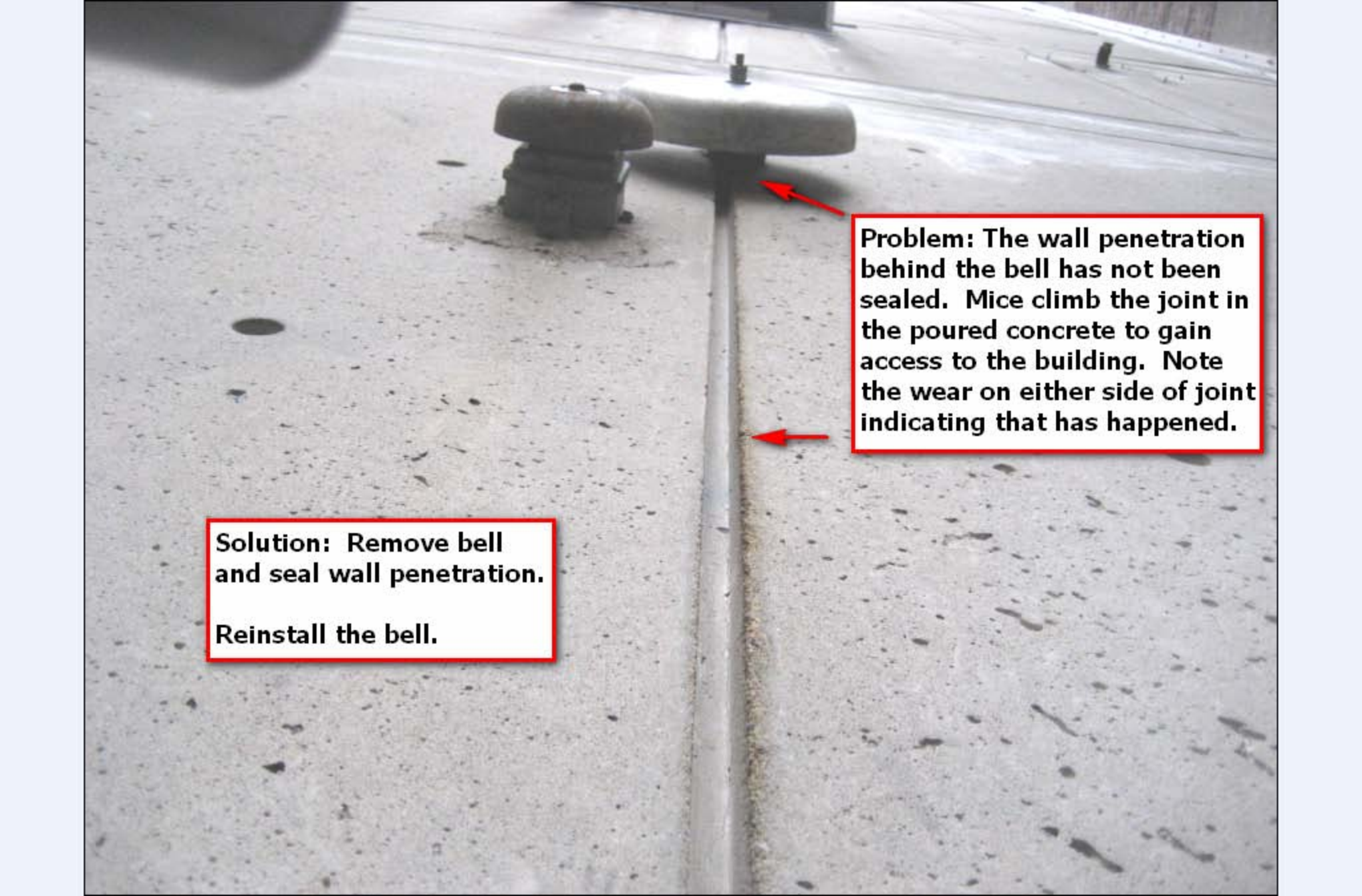
**From the front, this standpipe plate appears completely normal.**



**Problem:** From both the top and bottom, mice and insects can gain access to the building through the joint in the poured concrete.

**Solution:** Seal penetration on the top and bottom.



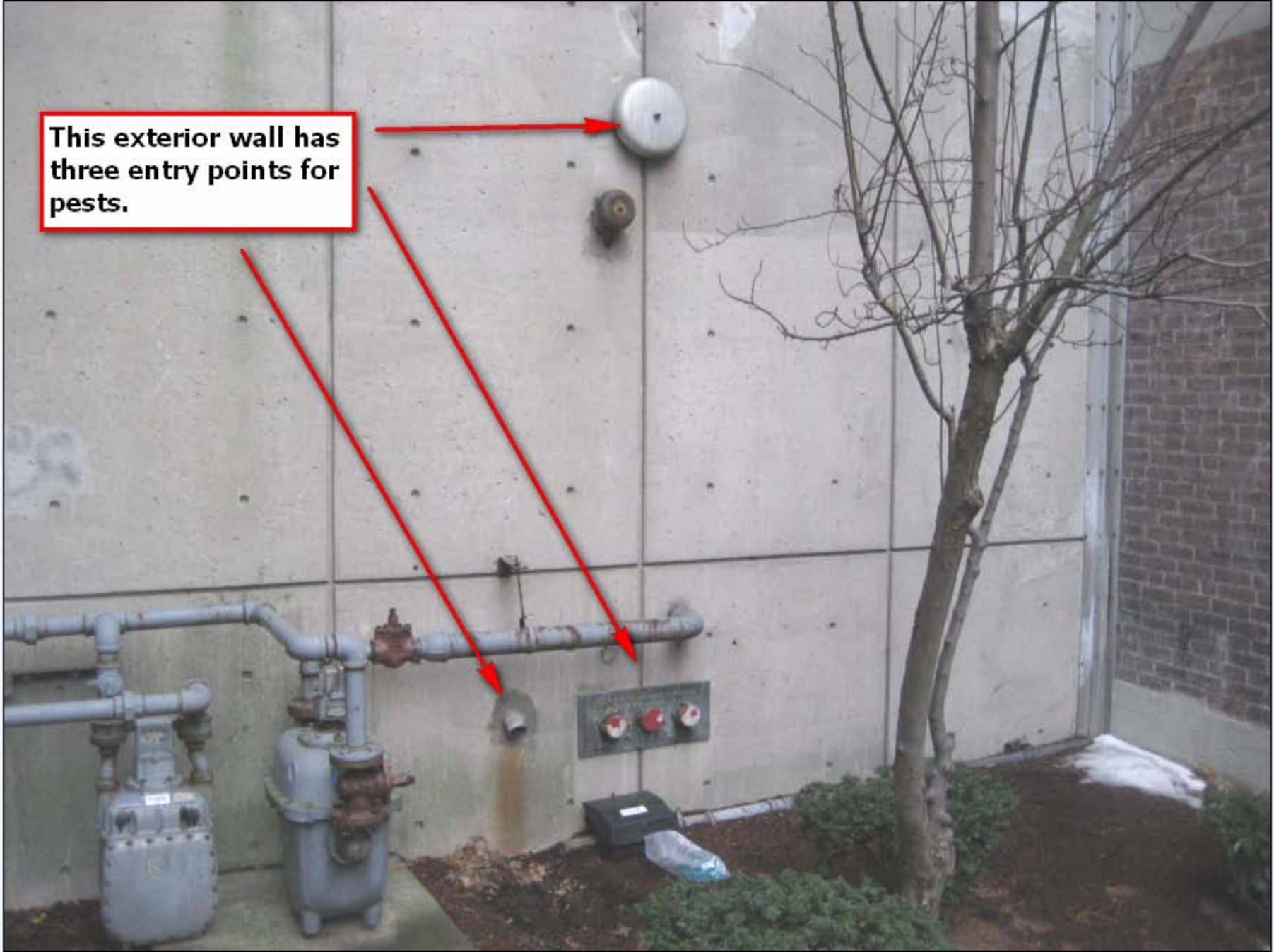


**Problem:** The wall penetration behind the bell has not been sealed. Mice climb the joint in the poured concrete to gain access to the building. Note the wear on either side of joint indicating that has happened.

**Solution:** Remove bell and seal wall penetration.

Reinstall the bell.

**This exterior wall has three entry points for pests.**



**Problem: the opening in the side of this metal window sill allows access to unit.**

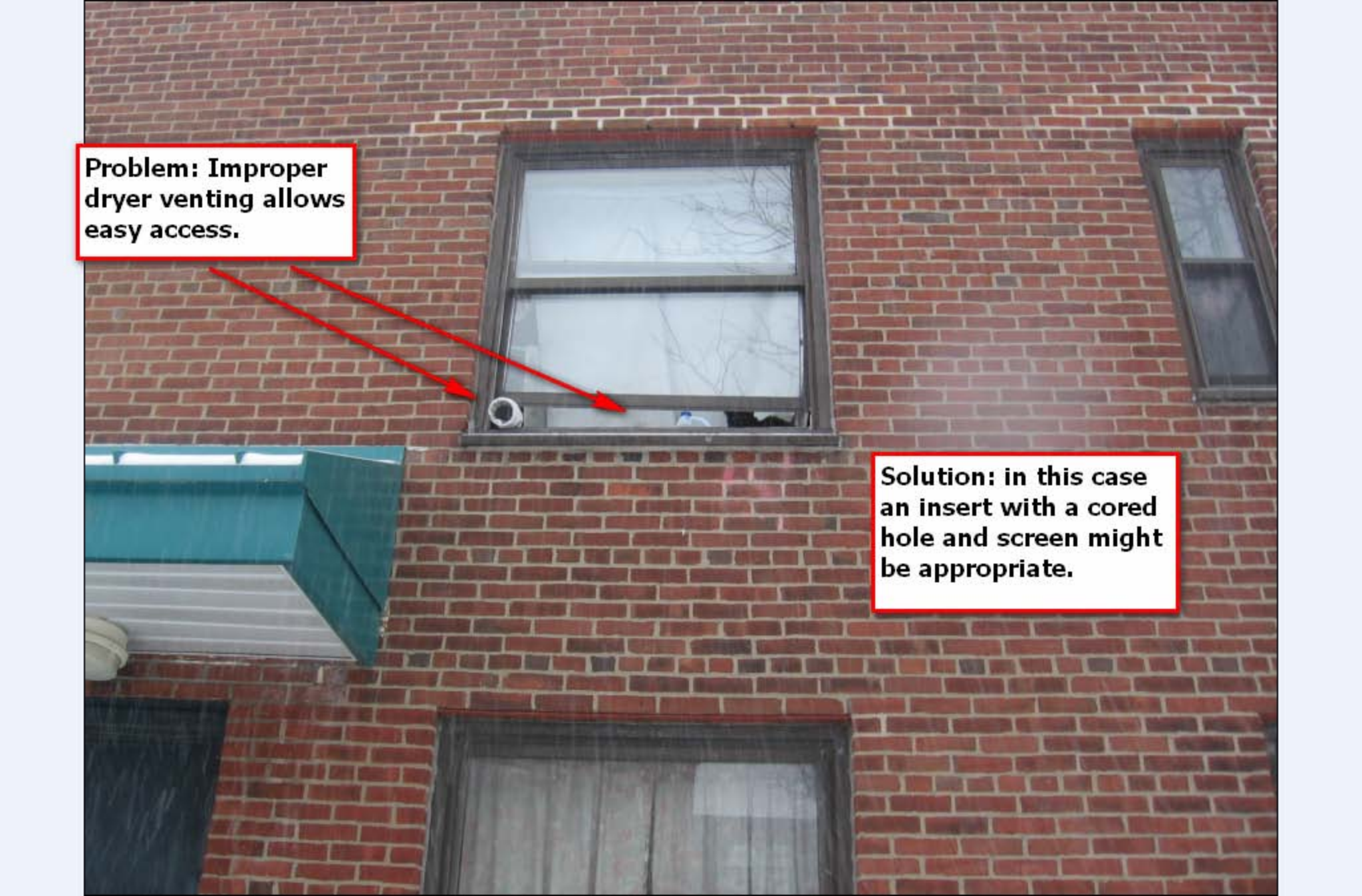
**Solution: plug or fill with foam**



**Problem: Eroded concrete below sill allows access to internal wall.**

**Solution: Patch & seal.**

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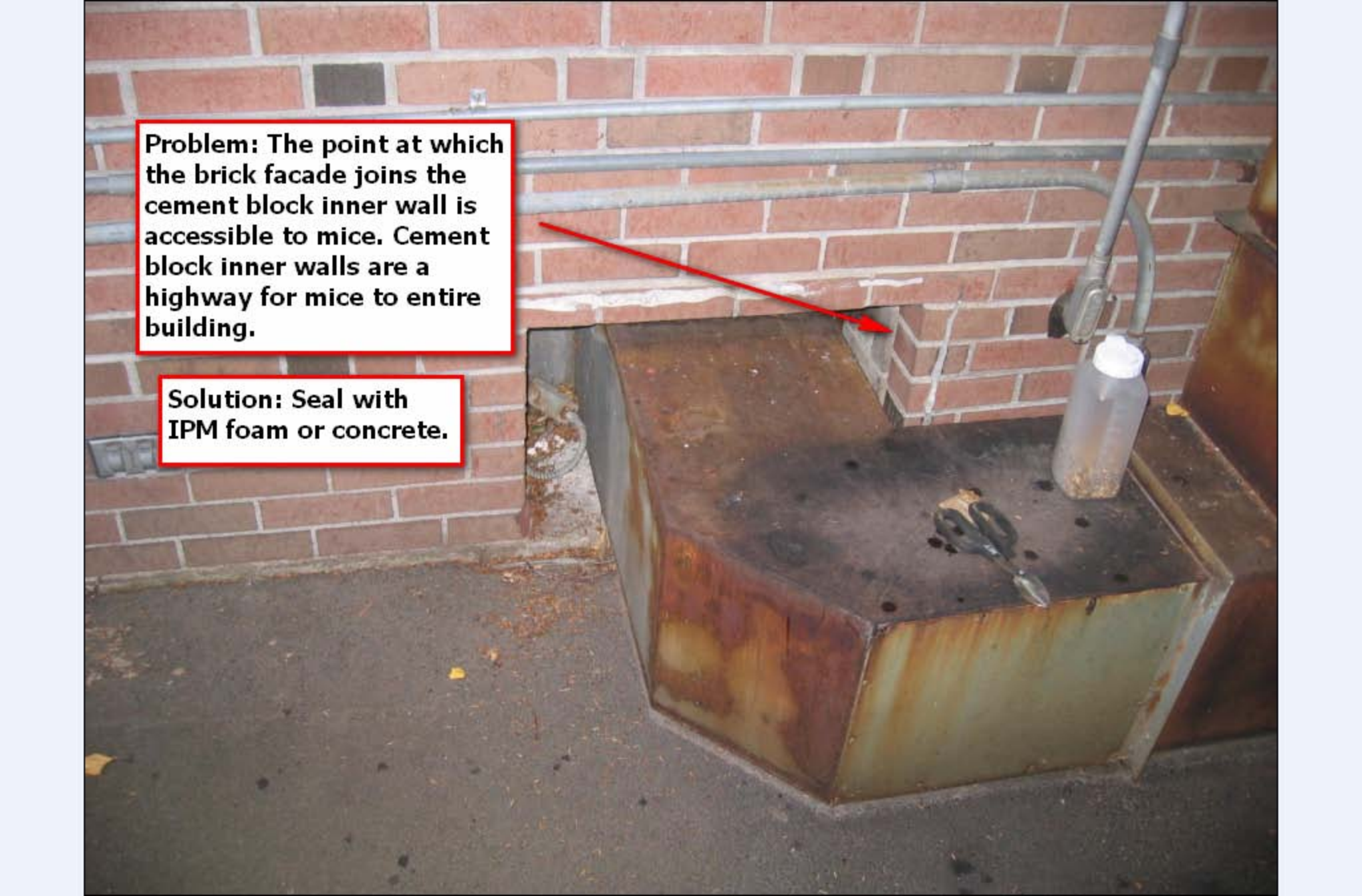
**Problem: Improper  
dryer venting allows  
easy access.**

**Solution: in this case  
an insert with a cored  
hole and screen might  
be appropriate.**

**Problem: lack of cover plates on electrical conduit box allows for access to building by pests.**

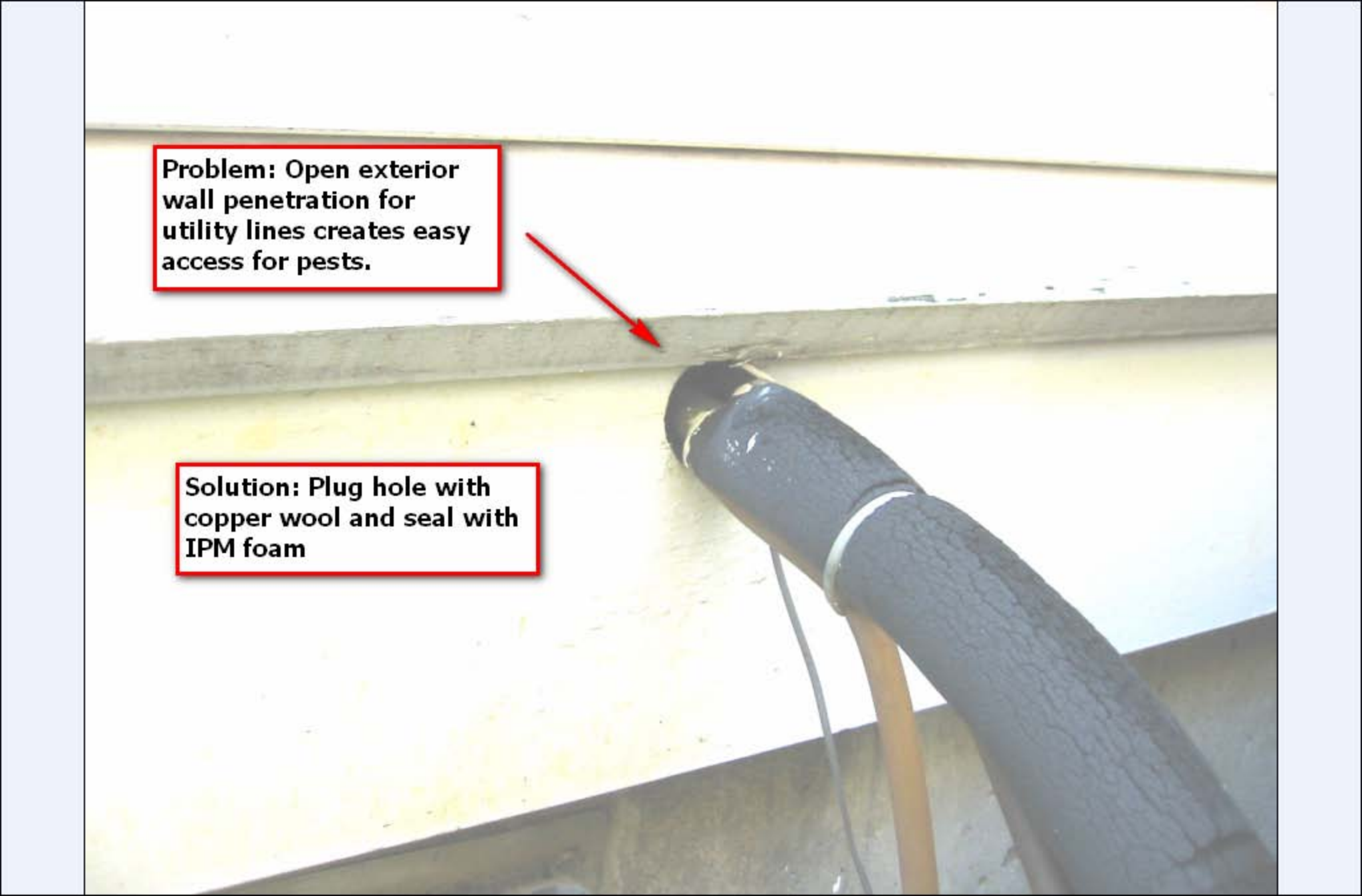
**Solution: install gasket and cover.**





**Problem:** The point at which the brick facade joins the cement block inner wall is accessible to mice. Cement block inner walls are a highway for mice to entire building.

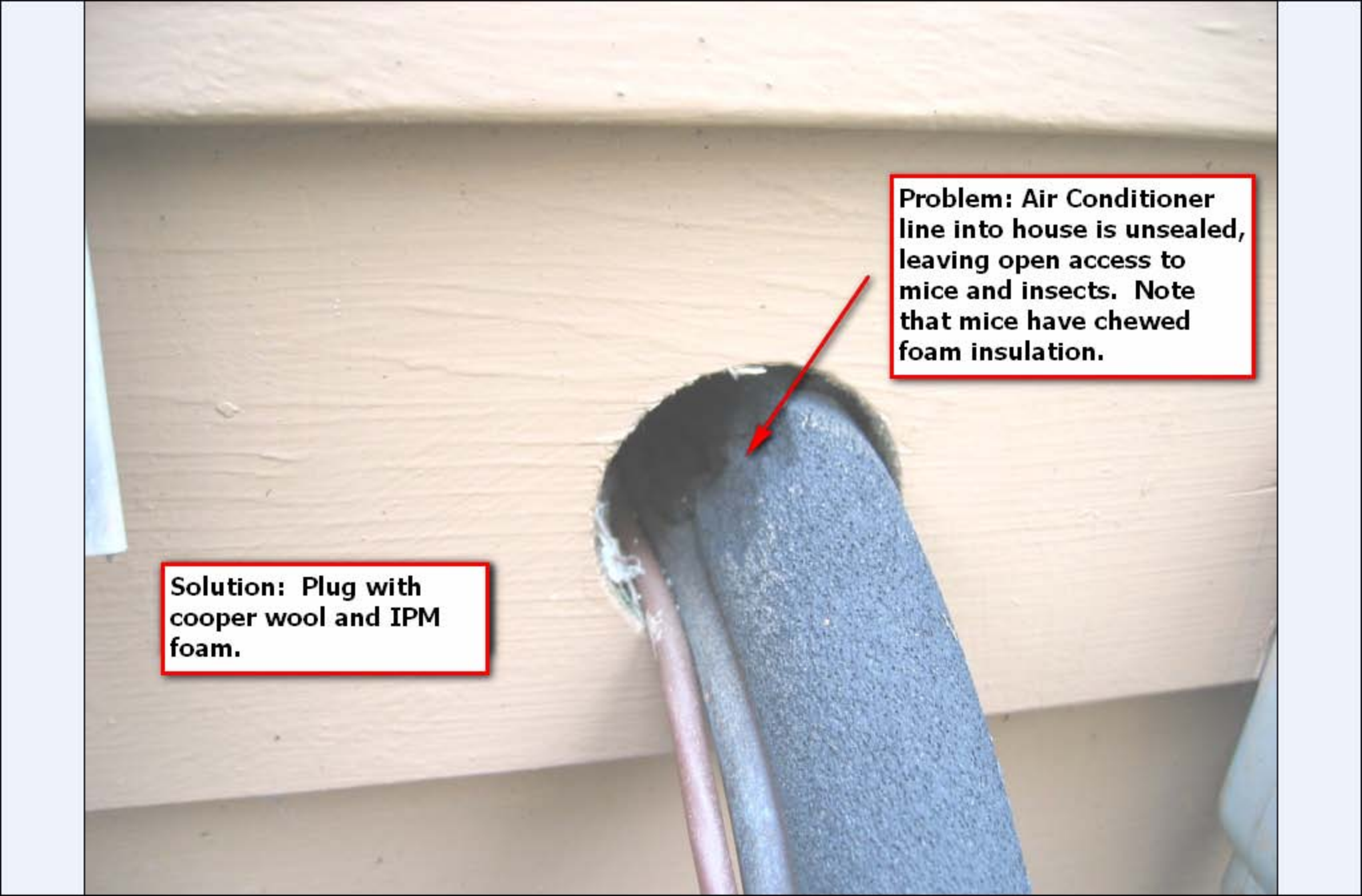
**Solution:** Seal with IPM foam or concrete.



**Problem: Open exterior wall penetration for utility lines creates easy access for pests.**


**Solution: Plug hole with copper wool and seal with IPM foam**






**Problem: Air Conditioner line into house is unsealed, leaving open access to mice and insects. Note that mice have chewed foam insulation.**

**Solution: Plug with copper wool and IPM foam.**



**Problem: Gaps around this vent allow mice and insects into building.**

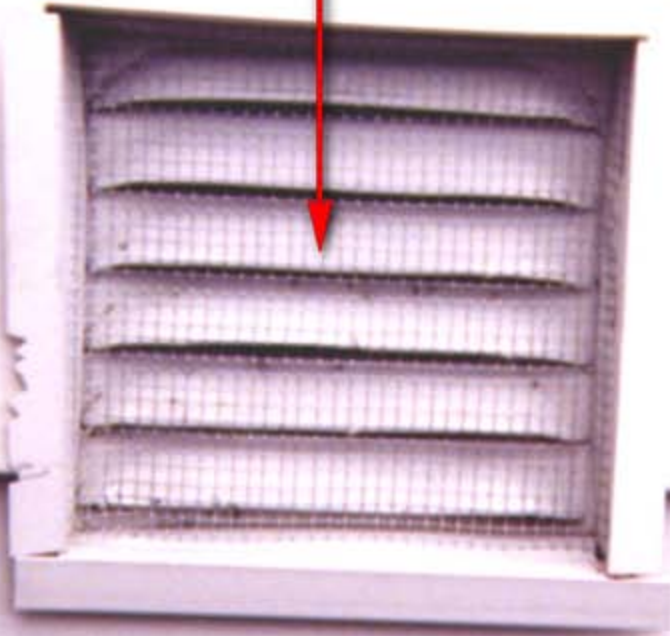
**Solution: Seal around vent, preferably with a wider lip to vent, or fill void with concrete.**




**Problem: Rotted  
wire mesh allows  
access to mice,  
rats & birds.**

**Solution: Repair  
with Rat Wire.**

**Prior to the installation of 3/4" Rat Wire, this dryer vent was accessible to rats and mice.**






**Problem: the wire mesh screen in this vent has rotted out, allowing access to birds & mice.**

**Solution:  
Repair screen.**

**Problem: This grate is not intended for this use. it allows access to mice.**


**Solution: Install Rat Wire behind it.**





**Problem: this vent is open enough to allow birds to nest.**

**Solution: Cover with wire.**

A close-up photograph of a brick wall and a gutter. The gutter is a dark metal channel attached to the wall. There is a visible gap between the brickwork and the gutter. A red arrow points from a text box to this gap. The brickwork is made of red bricks with grey mortar. The gutter is mounted on a light-colored surface, possibly a concrete or plaster wall. The gutter itself is a dark, possibly black or dark grey, metal. The gap is located at the top of the gutter, where it meets the brickwork. The brickwork is on the left side of the image, and the gutter is on the right side. The gap is a narrow opening between the brick and the gutter. A red arrow points from a text box to this gap. The text box is white with a red border and contains the text "Problem: Gap between Masonry and Gutter allows entry for mice." The gutter is a dark metal channel attached to the wall. There is a visible gap between the brickwork and the gutter. A red arrow points from a text box to this gap. The brickwork is made of red bricks with grey mortar. The gutter is mounted on a light-colored surface, possibly a concrete or plaster wall. The gutter itself is a dark, possibly black or dark grey, metal. The gap is located at the top of the gutter, where it meets the brickwork. The brickwork is on the left side of the image, and the gutter is on the right side. The gap is a narrow opening between the brick and the gutter. A red arrow points from a text box to this gap. The text box is white with a red border and contains the text "Problem: Gap between Masonry and Gutter allows entry for mice."

**Problem: Gap between Masonry and Gutter allows entry for mice.**

**Solution: Use a grouting piece (a 1' x 1' board") below gutter and seal**





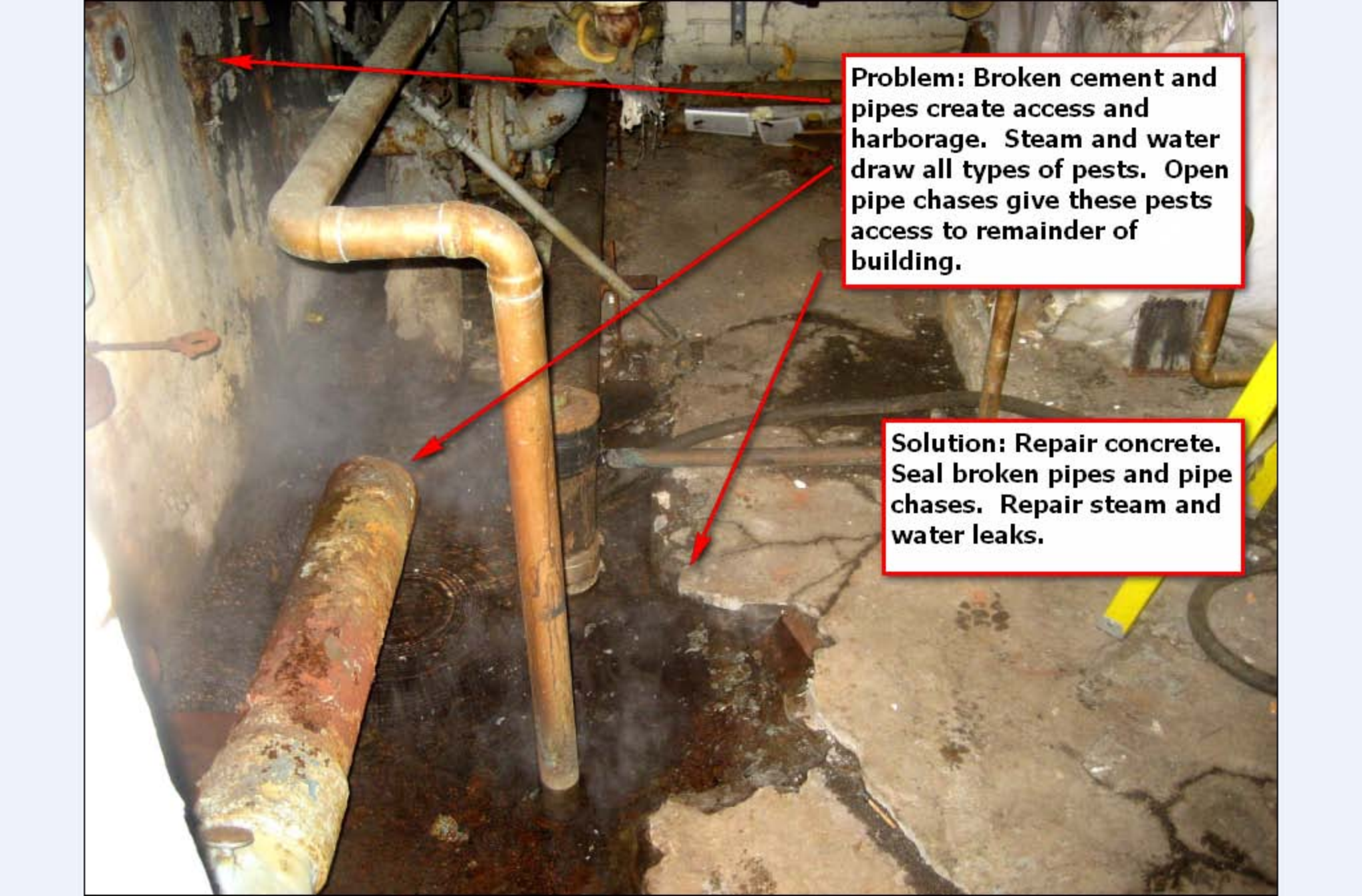
**Problem:**  
Building facade projects too far down to grade, this allows pest entry to void between interior and exterior walls.

**Solution #1:** Lower grade and block entry with expanded steel.

**Solution #2:** Dig out and fill with 3/4" gravel.

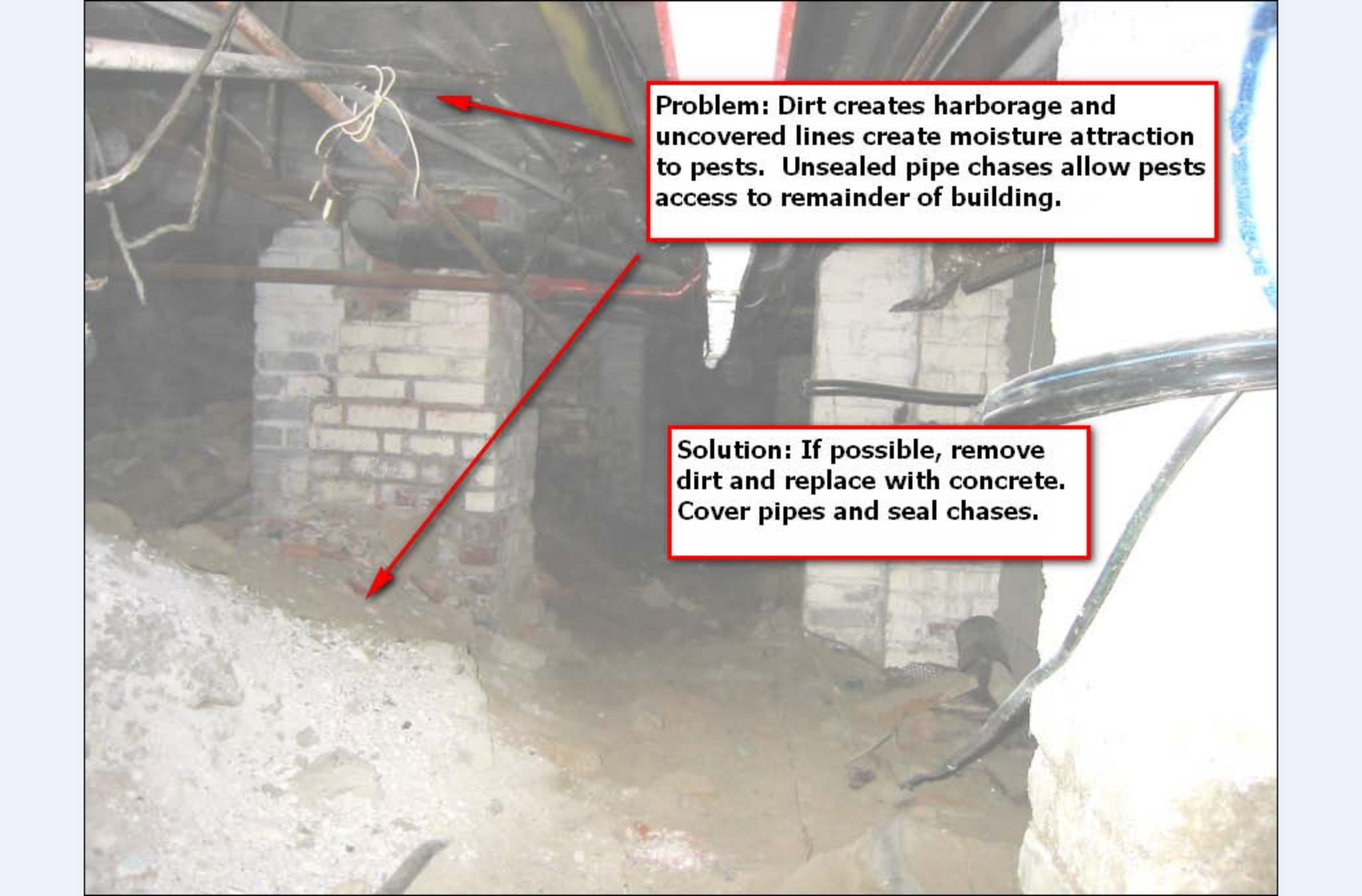
**Detail of previous  
picture.**





**Problem: Broken cement and pipes create access and harborage. Steam and water draw all types of pests. Open pipe chases give these pests access to remainder of building.**

**Solution: Repair concrete. Seal broken pipes and pipe chases. Repair steam and water leaks.**



**Problem: Dirt creates harborage and uncovered lines create moisture attraction to pests. Unsealed pipe chases allow pests access to remainder of building.**

**Solution: If possible, remove dirt and replace with concrete. Cover pipes and seal chases.**



**This is an example of a basement crawl space that has been abated using concrete. Note also the pipe covering to reduce condensate problems.**



**Problem: Brown mold indicates a moisture problem in this basement crawlspace.**

**Solution: Ensapsulate dirt and ventilate basement.**

**Problem: Abandoned boiler equipment provides access, harborage and water.**

**Solution: Where possible, demolish and remove.**

