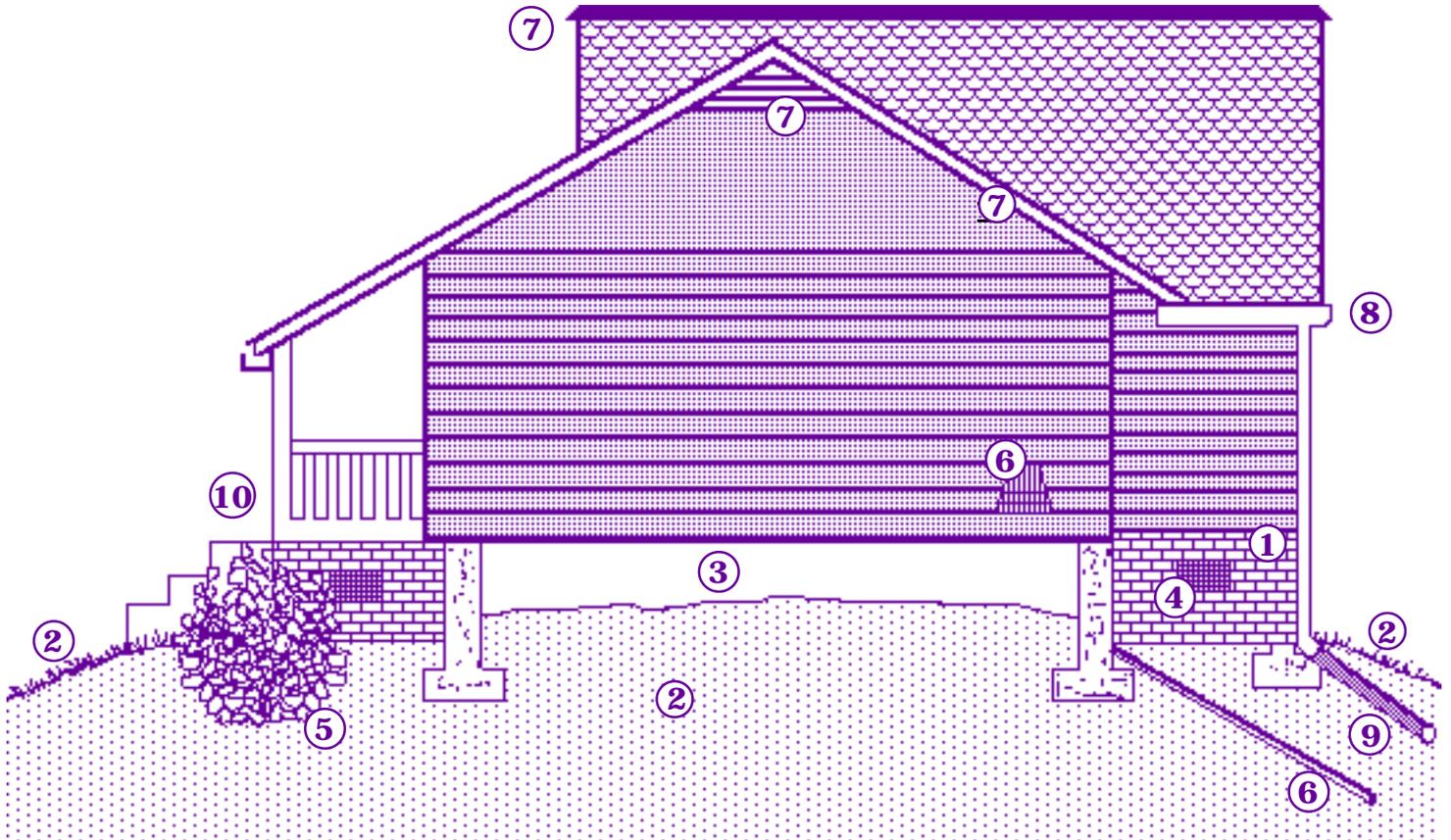


The Billion Dollar Thief: Moisture



QUESTIONS TO ASK WHEN BUYING OR BUILDING A HOUSE.

1. Is all exterior siding at least six inches above the soil and mulch level?
2. Does the slope away from the foundation meet code requirements on all sides?
3. Is the soil level in the crawl space higher than the soil level outside around the foundation?
4. Are all foundation vents open and free from obstruction both inside and outside?
5. Is landscape foliage at least 5 feet from the side of the house and not blocking foundation vents?
6. Do the clothes dryer vent and the air conditioner condensate drain both empty to the outside?
7. Are there at least two different types of attic vents (soffit plus ridge, gable or turbine vents)?
8. Are gutters clean and in good shape?
9. Do all downspouts have splashblocks or drain pipes?
10. Is all exterior decking and other exposed wood preservative treated to the correct retention level?

MOISTURE METER READINGS

- Make sure to take readings from every corner of a crawl space and from areas commonly prone to having excess moisture, such as the areas around plumbing fixtures in kitchens, laundry rooms, and bathrooms; the sills under sliding glass doors; and places where chimneys, porches, garages and patios adjoin a house;
- If the meter reads 20 - 24%, **CAUTION:** look for sources of the excess moisture;
- If the meter reads 25 - 30%, **BEWARE:** decay damage will most likely be present.

For more information order Extension leaflet entitled “Wood Moisture Content.”

GUTTER WATER MANAGEMENT

- Overhangs should be at least 18 inches wide;
- Gutters should be cleaned, inspected and repaired on a regular basis;
- Downspout to drainpipe systems are the preferred method for removing rain water from the gutters;
- Clay tile or flexible pipe should be used to conduct gutter water underground to a suitable release outlet at least 10 feet down hill and away from the house;
- Suitable release sites for downspout drainage systems are: storm water drains, dry wells, or surface outlets;
- Splashblocks are an alternative method for gutter water management;
- Splashblocks made from masonry or concrete are more durable than other materials;
- Splashblocks should release water at least 5 feet from the foundation.

For more information order Extension leaflet entitled “Controlling External Water Problems for Residences.”

LANDSCAPE PLANTING

- Landscape plants should not block free air flow through the crawl space vents;
- Planting materials should be placed beyond the drip edge of the roof, foliage at least 5 feet from the foundation;
- Finished planting beds and mulches should be lower than the ground level in the crawl

space and should be sloped away from the house.

For more information order Extension leaflets entitled “Landscape Management Checklist: Preventing Home Moisture Damage”, and “Relandscaping After HUGO — Two Major Considerations.”

CRAWL SPACE GRADING

- Crawl space grade should be higher than outside surface grade;
- An 18 in. minimum clearance should be maintained from the bottom of joists to the soil surface; 2-3 ft. is preferable;
- CABO Building Code requires that outside surface grade away from the foundation shall fall a minimum of 6 inches within the first 10 feet, (approximately a 5% slope).

For more information order Extension leaflets entitled “Most Common Moisture Control Construction Problems”, and “Relandscaping After HUGO — Two Major Considerations.”

SUMP PUMPS

- Sump pumps should be used only in extreme cases where drainage is either too difficult or economically unfeasible to correct;
- Sump pumps should be located at the lowest point in a basement or crawl space;
- Sump water must be discharged into a storm drain, dry well, or surface outlet.

For more information order Extension leaflet entitled: “Controlling External Water Problems for Residences.”

INSULATING HEATING AND COOLING DUCTS

- Insulate exposed heating and cooling ducts (likewise hot and cold water pipes) to a minimum of R-6 to prevent condensation that could wet the surrounding insulation;
- Wet insulation holds water next to structural parts of a house which over time will promote wood decay;
- In areas where air conditioning is done over long periods of time, air leaks at joints in the ductwork may cause ducts to “sweat”;

- Properly sealed ducts should all be insulated to R-6; if necessary, however, this amount can be doubled to R-11 if only the outer layer of insulation is backed with a vapor barrier.

For more information order Extension leaflet entitled “Water Damaged Home Insulation.”

CONTROLLING MOISTURE IN THE CRAWL SPACE

- In humid areas of the country, foundation vents should be left fully open year around; insulate water pipes to prevent freezing danger;
- The CABO Building Code provides specifications for the **minimum** amount of required foundation ventilation; be sure, however, that the minimum number of vents provides adequate cross-ventilation;
- Vents should not be obstructed by ductwork and stored debris on the inside, or landscape plants on the outside;
- If foundation vents are not enough to control the ground moisture, cover the surface of the crawl space with 6-10 mil polyethylene to prevent moisture from vaporizing from the soil and reaching the wood in the substructure.

For more information order Extension leaflets entitled “Controlling Internal Moisture Problems in the Home,” “Most Common Moisture Control Construction Problems,” and “Installing Polyethylene in Crawl Spaces to Assist in Controlling Excess Moisture Vapor.”

MAN-MADE MOISTURE

- Clothes dryers should be vented to the outside, not into basements, crawl spaces, or attics;
- Bathrooms, kitchens, and laundry rooms should be fitted with exhaust fans that vent moisture laden air to the outside, not into attics or wall voids;
- Kerosene heaters should be vented to the outside, too, because they produce water vapor as a byproduct of combustion;
- Plumbing, both in the living area of a house and underneath in the crawl space or basement, should be inspected on a regular basis for leaks;

- Condensation from air conditioning units should be piped away from the foundation at least 10 feet and released to run downhill and away from the house;
- The suggested moisture level inside a house is between 35% and 50% relative humidity;
- If the relative humidity inside a house cannot be controlled through ventilation, use a dehumidifier.

For more information order Extension leaflets entitled “Controlling Internal Moisture Problems in the Home”, “Solving Moisture Problems with Vapor Barriers and Ventilation”, and “Dehumidifier Can Control Mildew.”

MANAGING RAINWATER WITHOUT GUTTERS

- Drip edge flashing should always be installed at the roof edge even when gutters are used;
- Overhangs should be at least 30 inches wide to protect siding from rainfall and to keep roof water away from the foundation;
- To control backsplash, the ground surface underneath the roof edge should be covered with gravel or some other ground cover that will absorb the runoff water and reduce the splash;
- Porches, patios or decks should be sloped away from the house to promote good drainage.

For more information order Extension leaflets entitled “Controlling Moisture with Overhangs and Flashings” and “Roof Repairs Number 5, Flashing and Sealing.”

FLASHING

- Drip edge flashing should be applied to all roof edges and the tops of all exposed windows and doors;
- Flashing should be installed wherever roofing meets siding; Siding should be cut short of the roofing shingles by approximately 1 inch, and any cut wood edges sealed against water entry;
- Joints in siding materials should be flashed or the ends of the wood treated with a water repellent preservative to prevent water entry;

- Include flashing underneath all exterior doors and windows;
- Flash the top of foundation walls to prevent water from wicking up through the foundation block and wetting the wood in the substructure;
- Prefabricated chimneys should have a cap of flashing that extends several inches down on all sides.

For more information order Extension leaflets entitled “Controlling Moisture with Overhangs and Flashings” and “Roof Repairs Number 5, Flashing and Sealing.”

ATTIC VENTILATION

- Soffit vents should be installed in combination with at least one other vent at the top of the roof, preferably a ridge vent;
- Stored material should not interfere with cross-ventilation;
- Baffles should be used to prevent attic insulation from blocking air flow through the soffit vents.

For more information order Extension leaflets entitled “Controlling Internal Moisture Problems in the Home” and “Solving Moisture Problems with Vapor Barriers and Ventilation.”

WOOD IN CONTACT WITH THE SOIL

- CABO Building Code requires that untreated wood siding never be closer than 6 inches from the soil or mulch surface;
- CABO also requires that untreated structural wood, such as sills, joists, plates, etc., be no closer than 8 inches from the surface of the soil or mulch;
- If treated wood is used, the proper retention level or exposure condition must be chosen; above ground, ground contact, wood foundation, or salt water;
- Wooden stairs and decks and all other exposed wood should be built of appropriately treated wood and sealed with a layer of paint or water repellent stain.

For more information order Extension leaflets entitled “Landscape Management Checklist” and “Relandscaping After Hugo.”

This bulletin is a companion document to the videotape entitled “The Billion Dollar Thief”, the first videotape in a five-part series on moisture-related problems in housing, “Managing Moisture—the Housing Menace.” In this bulletin we re-emphasize and clarify specific points mentioned in the videotape. The objective of the series of videotapes is to raise housing industry and homeowner awareness of the many problems associated with excessive moisture accumulating in houses.

A list of other bulletins, videotapes and slide sets about moisture-related problems in residential housing can be obtained from your local Clemson University Cooperative Extension Service county agent.

As a minimum when building, follow building code requirements for your area. Additional precautions may be necessary, depending on your particular situation.

Linda Redman, Ph.D.
Extension Housing Specialist
Dept. of Home Economics
Clemson University

Rachel Rowe
Ag. Science Associate I
Dept. of Forest Resources
Clemson University

Partial funding provided by the Clemson University Housing Institute.