

BUILDING ASSESSMENT

The goal of every building is to have comprehensive and continuous management of:

- Bulk water
- Air leakage
- Heat flow
- Vapor (and soil gases)
- Pests (insects, rodents, etc.)
- Wildfire (location-dependent)
- Indoor Air Quality

When we improve the energy efficiency of a building, we need to evaluate moisture management with the same degree of care. This worksheet systematically lists the items you need to check to understand how and how well a building is performing in terms of energy, durability, and human health and safety.

The final section—Explanations/Resources—can help you with each item below.

RENOVATOR: _____ INTERIOR DESIGNER: _____

OWNER: _____ ARCHITECT: _____

BUILDING ADDRESS: _____

TRADES: _____

DATE OF ASSESSMENT: _____

EXISTING BLDG

Stories: _____ Foundation Type _____

Orientation: _____ Exterior Siding _____

Garage (attached/detached)

Year built _____

Years in building _____

History

Complaints and Problems Noted

Comfort Issues

Summary of Scope of Work

SITE ASSESSMENT

Prevailing slope(s):

Irrigation system check: -

Water table depth:

Landscape details:

Pervious/impervious surface details:

Notes on drainage issues:

INSULATION/AIR SEALING

COMPONENT/ASSEMBLY	ORIGINAL BLDG	EXISTING ADDITION	NOTES

WINDOWS

TYPE	U VALUE	SHGC	NOTES

MOISTURE MANAGEMENT

Flashing – windows:

Flashing – doors:

Flashing – valleys:

Flashing – drip edge:

Gutters/downspouts:

Capillary breaks:

Roof ventilation:

Vapor Profile – Foundation:

Vapor Profile – Above Grade Walls:

Vapor Profile – Roof:

MECHANICAL SYSTEMS

SYSTEM	LOCATION	MODEL#/ BRAND	FUEL, EFFICIENCY, CAPACITY	CONDITION/AGE/NOTES

DUCT SYSTEMS

AREA SERVED	LOCATION	TYPE	INSULATION	SUPPLY AGAINST WALLS?	RETURNS: #/LOCATIONS	OBSERVED LEAKAGE/NOTES

EXHAUST VENTING

	VENTED TO OUTSIDE? THROUGH WHERE?	NOTES
Dryer		
Oven		
Bath Fans		
Kitchen range hood		

RADON

Radon test performed? _____ Test kit left with owner _____

Radon Mitigation? _____

OTHER:

Fireplace
(damper?) _____

Attic Access
(sealed?) _____

Whole building fan?

HAZARDOUS MATERIALS

Lead paint

Asbestos

Pest Management Details:

Wildfire Management Details:

Building Performance/Conditions Metrics:

Whole building air tightness (blower door) -

HVAC duct tightness (Duct blaster) -

HVAC flow (air velocity) measurements -

Room-to-room pressure measurements -

Worst-case depressurization test:

Low-e window testing -

Infra-red imaging -

Humidity (air moisture) readings -

Moisture content (material moisture) readings -

Explanations/Resources

Site Details:

- Prevailing slope: Does the site drain, in general, towards or away from the structure?
- Irrigation system check: if the building has an irrigation system, check to make sure that all heads or dispersers are turned away from the structure.
- Water Table Depth: The owner or a local county extension agent or planning/building department may have information on water table depth. The importance of this is determining how it relates to the foundation's depth and whether the foundation ever sees hydrostatic pressure. See: <https://www.buildinggreen.com/blog/water-tables-and-basements>.
- Landscape details: Does the landscape help manage soil and water or encourage run-off and soil erosion?
- Pervious/impervious surface details: Are soils and paved or driveways areas pervious; do they promote infiltration or ponding of water?
- Notes on drainage issues: The soil just around the building foundation is often fill that may be very different than the rest of the site. Check to see what this soil is like—sandy, clayey, silty, loose and well-draining or dense and poorly draining. The ability of the site to handle its water load is based in part on the drainage characteristics of site soil. For the 1st ten feet or so around the structure, is the grade away from the building or towards, or flat? A 5% grade (6 inches in 10 feet) is recommended around the structure. Are there neighboring site features that affect the performance of the building: shading trees, sloped sites onto property, etc.?

Insulation/Air sealing:

- You can check framed walls for insulation by drilling a small hole and inserting a coat hanger “hook” to gauge the depth of insulation and pull out a small sample.
- Carefully removing a window jamb casing can give you a great portal into how water, air and heat are being managed at the most common of wall penetrations, windows. Pick the least sheltered window if possible, in terms of overhangs, and most likely windward side of the building.

Windows:

- Glazing properties: The 4 major properties of glazing are U-value, Solar Heat Gain Coefficient (SHGC), Visual Transmittance (VT) and Air Leakage (AL). The single best source of information on window and glazing properties is the Efficient Windows Collaborative: <http://efficientwindows.org/>.
- Glazing area: as a percent of floor area, this can be an important aspect of excessive heat loss or gain; passive solar buildings can have as little as 7% glazing with typical buildings having around 14% glazing (aspect of course is important too).

Moisture Management:

- Flashing: All of the protection systems—drainage plane (WRB), air barrier, and thermal barriers can be challenged here, at the transition from the top of the foundation wall to the start of the framed assemblies. Inspect from both the exterior and the interior to see if this transition area is continuously protected, including how penetrations are flashed and/or sealed.

Decks are another very common problem area—how they attach and are (or are not) properly flashed.

- Gutters/downspouts: how is the roof load managed? Gutters and downspouts? Are there surface-level French drains handling water off the eaves? Are gutter system leaders connected to perimeter drainage; do splashblocks and run-outs move the roof load 2 or more feet away from the building?
- Capillary breaks: a free-draining air space or any non-porous material breaks the capillarity of water and stops wicking of water up and into building assemblies. The most common capillary breaks are between masonry and wood and between wood and soil. Inspect any ground contact of claddings and inspect mudsill contact with concrete foundations.

A capillary break between the soil and the concrete floor could be any non-porous or free-draining material such as polyethylene sheeting, rigid insulation, or gravel (no fines). One indication of these, since you may not be able to inspect, is to use the ASTM 4263 Polyethylene Sheet Test (<http://www.nrmca.org/aboutconcrete/cips/28p.pdf>). Check the basement or crawlspace floor for penetrations, both as potential problem areas but also as inspection spots.

- Vapor Profile: This is a layer by layer accounting for relative vapor permeability of building assemblies to determine how they are specified to keep the assembly from getting wet AND to account for how the assembly can dry should (or more likely when) it gets wet. For detailed information on this topic, see this GreenBuildingAdvisor web resource: <http://www.greenbuildingadvisor.com/blogs/dept/building-science/vapor-profiles-help-predict-whether-wall-can-dry>

Mechanical System Details

- Combustion sources: wood stoves, gas cooktops, fireplaces, unvented space heaters are all open combustion devices, as are atmospherically-vented boilers, furnaces and gas water heaters. They should be evaluated for back-drafting potential. See the worst-case depressurization test below.
- Heating and Cooling details: Check maintenance schedule; confirm when each system was last inspected, maintained.
- Dehumidifier/humidifier: Hygrometers or relative humidity (RH)sensors for most dehumidifiers and humidifiers are notoriously inaccurate. Each should be supported by more accurate RH assessment (electronic hygrometer) or spot-checked against a sling psychrometer. The need for either or both dehumidification or humidification should be evaluated based on whole-building performance and overall moisture management. Both treat the symptoms and not the cause of moisture levels. See this GBA resource Measuring (and Understanding) Humidity: <http://www.greenbuildingadvisor.com/blogs/dept/building-science/measuring-and-understanding-humidity> .
- Ventilation system: Is there a whole-building ventilation system (any building with air tightness of .35 NACH (“natural air changes per hour) or less should have a fresh-air whole-building mechanical ventilation system: exhaust, supply, or balanced heat recovery system.
- Water heating: Check gas water heaters for evidence of roll-out back drafting; check water heater for evidence of leaks.

Ducting Details

- Ducting details: Are all ducts in conditioned space? Are ducts and the air handler cabinet, return and supply trunks all sealed?

Exhaust Venting

- Spot exhaust: Every room with a moisture load (bathrooms, kitchen, laundry) should have a functioning spot exhaust system, ducted to the outdoors. You can qualitatively

check the “draw” of bath and laundry room exhaust fans by holding up two-ply toilet tissue—if the tissue “sticks” to the exhaust grille when the fan is operating, it has sufficient draw; if not, check the ducting or considering replacing the fan.

Radon/Hazardous Materials

- Hazardous materials assessment: Lead paint test sticks are carried by local hardware stores (EPA lead guide: <http://www.epa.gov/lead/pubs/leadtest.pdf>), radon test kits are available on-line or from many state/local agencies (<http://www.epa.gov/radon/pubs/citguide.html>), and asbestos testing requires a lab, although a list of common materials containing friable asbestos can be found here: <http://www.inspect-ny.com/sickbuilding/asbestoslook9.htm>.

Pest Management

- Pest management details: Insects—mainly termites and carpenter ants—can be big problems; their management is well-covered by fact sheets from Dr. Mike Potter of the University of Kentucky extension office: <http://entomology.ca.uky.edu/homehealth> . Check around the building for branches that make contact with the structure and then around the perimeter at grade looking for woody debris or other woody materials (firewood, for example) that is stored close to or actually against the building. Squirrels seem to be a big problem for some buildings: management advice can be found here: <http://extension.missouri.edu/publications/DisplayPub.aspx?P=G9455>.

Wildfire Management: In areas where wildfire is a threat, use these resources to check hazards and counter measures:

http://ucanr.edu/sites/cfro/Research_and_Projects/Building_in_Wildfire-Prone_Areas_Program/.

Building performance metrics:

- For a good explanation of how blower doors work - <http://www.buildingenergy.org/archive/hem.dis.anl.gov/eehem/94/940110.html>.
- For an explanation of building pressure measurements, including room-to-room measurements (doors closed) - www.energyoutwest.org/eow_2008.../Cox_Performance1.pdf.
- For an explanation of the worst-case depressurization test - www.affordablecomfort.org/.../LEAR_5_Cox_Worst_Case_Depressurization.pdf.
- Examples of low-e window testing equipment - http://www.edtm.com/1_LowE_Detection.htm?_kk=test%20low%20e&_kt=c31d5dda-d79a-4b90-9775-27a0508683e8&gclid=CLzjmbTgr5wCFdZM5QodsHn9kQ?1.
- For information on electronic hygrometers, go here: <http://www.greenbuildingadvisor.com/blogs/dept/building-science/moisture-sources-relative-humidity-and-mold>.
- For more information on moisture meters, go here: <http://www.greenbuildingadvisor.com/blogs/dept/building-science/tools-trade-moisture-meters> and here: <http://www.greenbuildingadvisor.com/blogs/dept/green-building-blog/moisture-meters-extending-their-reach> .