



Investigation and Recommendations for Healthy Building Initiative

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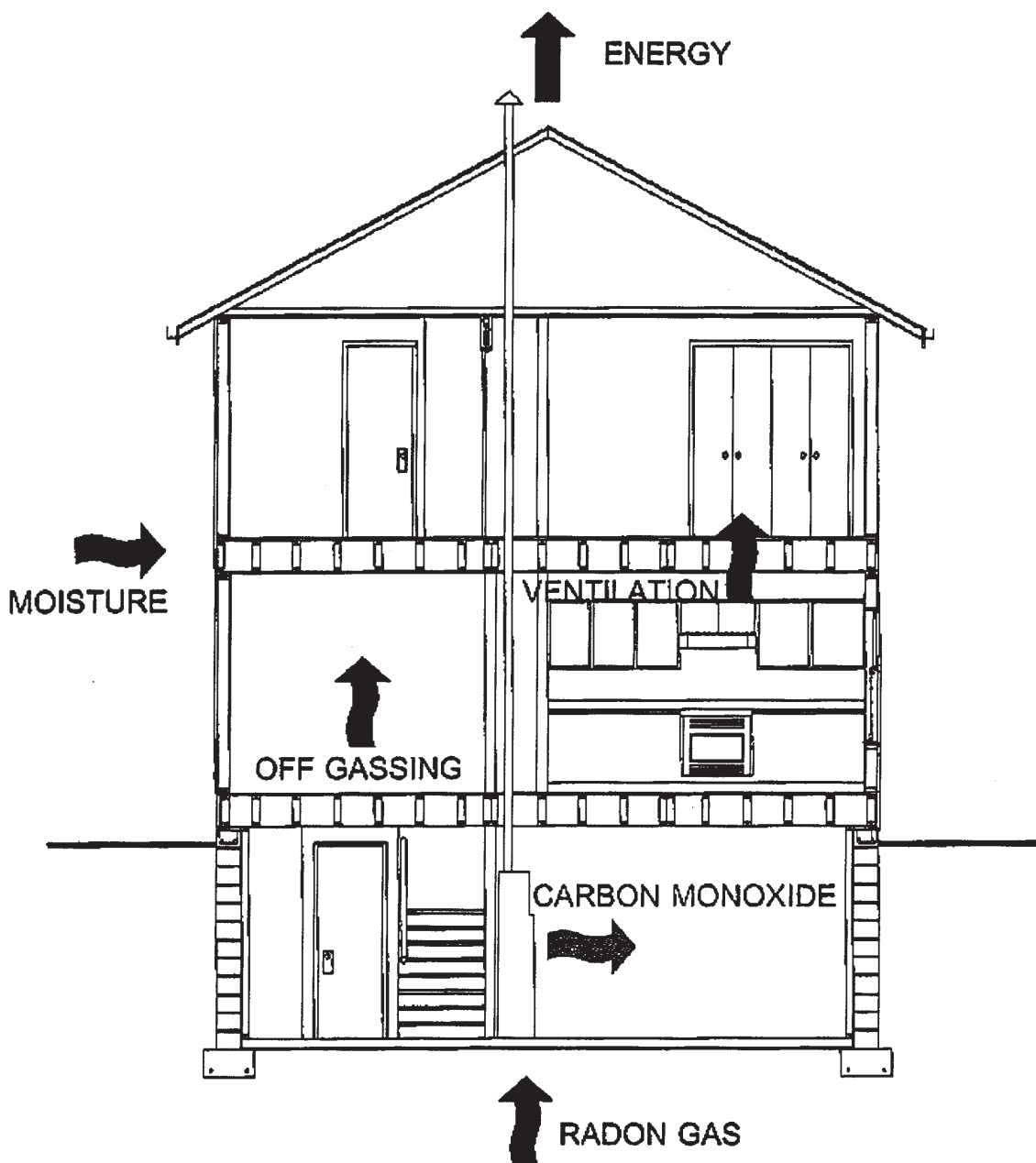
*House by House
Block by Block*



Healthy Building Design is the process of designing spaces, selecting systems, products, materials and fixtures to maximize the health of the occupants. Another way to look at this is minimizing the negative impacts of our choices on the occupant's health. The negative impacts of our decisions are usually associated with some type of contaminant. The three primary strategies used to minimize impacts are "eliminating, separating and ventilating". The six categories used in our summary below all take advantage of one or more of these approaches.

We have also added energy efficiency as a category even though it is not directly linked to the health of the occupant; taking energy efficient measures can be in conflict with Healthy Design.

The following summaries are designed to explain why it is important to take these measures. We understand that most of the strategies recommended are being incorporated into the rehabilitated multi-family buildings.



Within each topic area (Carbon Monoxide, Ventilation, Moisture, Energy and Off-gasing) LHB has identified particular issues to be addressed and outlined a course of action with associated costs.

Item - A specific item identified by LHB to look at.

PPL Proposed Improvements - Typical action to be taken in the standard renovation work.

Possible Upgrades - LHB comments on additional actions to be considered.

Anticipated Work - Indicates any adoption of additional LHB recommendations.

Priority / Cost - LHB ranking of importance for those items listed.

Carbon Monoxide ^{topic area 1} Carbon monoxide is the most serious contaminate associated with our built environment. It is also known as the "silent killer". Incorporating Sealed combustion furnaces and direct vent hot water heaters is a good example of "separation". There is still a carbon monoxide by-product, but it is dealt with in a sealed system, vented directly to the outside, using powered fans and a vented system. The existing systems rely on sheet metal flues and gravity to get the Carbon monoxide to the outside environment. By sealing up our buildings to improve energy efficiency and adding mechanical ventilation, as simple as a vented kitchen fan, can pull the carbon monoxide gas to the inside. This is the single most important step to take to assure a healthy environment.

Carbon monoxide detectors should be added as a back up system to detect any possible system leaks
Combustion air must be supplied to all furnaces to meet current code.

Carbon Monoxide

Item	PPL Proposed	Possible Improvements	Anticipated Work	Priority/Cost Upgrades
Carbon Monoxide Detector	New detector will be installed in any units with furnace inside the unit	One hard-wired carbon monoxide detector in each unit	Will install combined unit with fire alarm, hard-wired, as a matter of PPL policy	1
Combustion Air	Provide new combustion air line in all units	No additional recommendations	To be installed in standard renovation	
Boilers	New standard efficiency boilers in 6 or 7 out of 8 buildings	New high efficiency, sealed combustion boilers in all buildings. (Heil-Mclain "Gold GV")	Upgrade is not anticipated at this time. LHB priority is 2	\$500 to \$800 per boiler cost increase \$5,000 to \$8,000
Water Heaters	New standard efficiency hot water heaters in 75% of the units	Direct vent or electric hot water heater in all buildings (A.O. Smith "Sealed Shot")	Upgrade is not anticipated at this time. LHB priority is 3	Allow \$300 per direct vent water heater \$6,000 for 20 units

Ventilation topic area 2

Ventilation is the second most important strategy. Even after all steps to eliminate and separate, there are always contaminants present. The new Minnesota Energy Code will soon require mechanical ventilation in order to diminish the potential hazards of moisture causing mold and mildew.

Kitchen fans and bathroom fans are a basic step in providing adequate ventilation. Both must be ducted directly to the outside, not into attic spaces or through filters, as is often the case. This does not deal with the problems caused by contaminants. We highly recommend hard wiring a low-sones (quiet) and high efficiency (low cost) fan in every unit. This will assure that there is always a fan running. If the fan requires a switch to be turned on, many tenants will choose not to run the fan in order to save money. These fans cost only \$1 or 2 per month to run, not including heat loss.

The ultimate system is a complete ducted ventilation system using an air-to-air heat exchanger. This involves the use of a low cfm (cubic feet per minute) fan that circulates fresh air throughout the entire space at a constant level. In addition, the technology allows the heated air to transfer its heat to the incoming air at an efficiency rate of over 90%.

One building has a forced air distribution system, we recommend a filtration's system. Using a 4" pleated filter will pick up the vast majority of particulate in the air.

Ventilation

Item	PPL Proposed	Possible Improvements	Anticipated Work	Priority/Cost Upgrades
Kitchen Fans	New, exterior vented fan in each bathroom (in all units)	No additional recommendations	To be installed in standard renovation work	7
Filtration	Provide standard filters in forced air systems	4" pleated filters in forced air systems	To be considered	8
Bath Fans	Provide new, exterior vented fan in each bathroom (in all units)	One, hard-wired, high- efficiency, low sones fan in each unit, to operate all the time (i.e. "Panasonic" FV08)	Upgrade to be included in the standard renovation work	7 \$100 each/ \$2.00/month operating cost \$2,400 for 24 units
Ventilation	None proposed except bath and kitchen fans	Air to air heat exchanger (heat recovery ventilator) in each unit with associated ductwork	Upgrade is not anticipated at this time. LHB priority is 6	\$2,000 to \$3,000 per unit \$48,000 to \$72,000 for 24 units
Central Vacuum	None proposed	Central vacuum system in each unit	Upgrade is not anticipated at this time. LHB priority is 16	\$1,000 to \$1,500 each unit \$36,000 for 24 units

Moisture topic area 3

Moisture is probably the most destructive containment that we are faced with in the built environment. Mold and mildew, caused by moisture, can be destructive to building components, including structure. In addition, it can be very troublesome for many individuals.

There is one primary strategy for avoiding moisture, beyond ventilation and no added humidity, and that is to keep the water out. Adding gutters and downspouts to get the water away from the buildings is a very cost-effective insurance. Roofs need to be repaired or replaced; exterior walls may require new finishes or caulk and basements that show water penetration will require aggressive measures. Eliminating the mold and mildew inside of the building without stopping the moisture penetration is a short-term fix at best.

Replacing windows with argon filled, low-E, double glazed units will be the best measure against condensation on the glass pane at moderate humidity levels (over 30%).

Moisture				
Item	PPL Proposed	Possible Improvements	Anticipated Work	Priority/Cost Upgrades
Windows	Provide new windows in approximately 75% of the units; vinyl clad, double glazed, operable, wood windows	Argon filled, low-E, double glazed windows in all units	Add Low-E double glazed windows	19 Argon-filled will add 30% to 50% the cost of windows
Gutters and downspouts	Provide new gutters and downspouts	No additional recommendations	To be completed in standard renovation work	--
Roofs	All new roofs and roof ventilation to code, increase insulation value to R-40	Install proper ventilation area (approximately 1/150th of plan area)	To be installed in standard renovation work	--
Basements	Patch, repair and clean to remove any mold and mildew	Waterproof exterior walls	Moisture penetration to be addressed in standard renovation work	4 Foundation waterproofing is cost prohibitive, Moisture penetration will be addressed
Exterior Walls	Re-dashing stucco, tuck point brick and caulk all cracks/penetrations	Investigate for mold and mildew	To be addressed in standard renovation work	5

Energy topic area 4

The energy recommendations appear to be included for the most part within the anticipated scope of work. The biggest reason for these measures is to reduce the operating costs for the tenants and/or building owners and improve tenant comfort. Additional wall insulation is not anticipated at this time due to cost considerations. However this will be considered in any cases where the interior or exterior sheathing is removed.

Energy				
Item	PPL Proposed	Possible Improvements	Anticipated Work	Priority/Cost Upgrades
Roof Insulation	Increase insulation value to R-40	No additional recommendations	To be installed in standard renovation work	--
Wall Insulation	Add insulation where feasible	Increase wall insulation to R20 minimum	To be addressed in standard renovation work	18 Additional insulation of exterior walls is cost prohibitive
Vapor Barriers	Add vapor barrier where feasible	No additional recommendations	To be addressed in standard renovation work	17
Controls	New controls installed with new heating systems	Thermostats for each unit with night set back	To be installed in standard renovation work	--
Lighting	Replace as required	Replace as required with compact Fluorescent fixtures and/or "smart lights"	To be installed in standard renovation work	--

Off-gassing ^{topic area 5}

Materials and finishes tend to contribute VOC's (volatile organic compounds) at varying levels while and for some time after they are applied or installed. Some examples include low level formaldehyde that emanates from particleboard to the solvent-based polyurethane coatings, which can smell and off gas strongly for months.

The typical strategy for materials and finishes is to eliminate or minimize the off gassing by selecting low VOC materials. Some individuals have a very high sensitivity to many products. This condition is known as Multiple Chemical Sensitivity.

Many low VOC products, such as paint and water based sealers are available wherever finishes are sold. Alternatives flooring materials include linoleum, a product manufactured mostly in Europe and/or ceramic tile, both which may be more expensive.

Off-gassing

Item	PPL Proposed	Possible Improvements	Anticipated Work	Priority/Cost Upgrades
Paint	New paint on all wall and ceiling surfaces	Use all low V.O.C. paints (i.e. "Glidden Lifemaster 2000")	To be completed in standard renovation work	9/Minimal
Living/Bedroom Floors	Sand and seal all existing wood floors	Use water-based polyurethane in lieu of solvent-based polyurethane	Solvent-base polyurethane with 2 to 4 weeks for off-gassing	15
Bath/Kitchen Floors	V.C.T. flooring on first floor, Sheet vinyl on second floor	Linoleum flooring "Forbo" in lieu of V.C.T.	V.C.T. and sheet vinyl	13 Linoleum would double the cost
Kitchen and Bath Cabinets	All new cabinets, standard wood veneer	Use low formaldehyde substrates (i.e. "Meditate II") in lieu of particle board	Availability may be dependent upon supplier	12
Countertops	All new plastic laminate countertops	Use solid surfacing (i.e. "Corian") in lieu of plastic laminate	Seal substrate on all 6 sides	11 Corian is not cost efficient
Lobby Floor	V.C.T. flooring	Ceramic tile in lieu of V.C.T.	Consider Upgrade	14 Ceramic tile would double the cost
Common Stairs	Vinyl treads	No additional recommendations	To be addressed in standard renovation work	--

Policy Issues topic area 6

Lead will be encountered on this project and is a known medical risk, especially among children in low -income urban environments. For this reason, we recommend a very aggressive approach to lead removal and abatement on this project.

Asbestos, another cancer causing material, is also likely to be found in these buildings. All asbestos should be identified and removed or encapsulated.

Radon is another well-known contaminant that is found frequently in our region in sub-surface conditions. Testing should be done. Solutions in existing buildings are not easy, however, testing is.

Pets can cause health problems inside of buildings. The primary concern is the dust mite problem. It is our understanding that no pets will be allowed in these buildings.

Policy

Item	PPL / LHB Position	Anticipated Work	Priority/Cost
Lead	Paint all interior existing plastic and wood surfaces and landscape or pave all exterior surfaces. All lead piping to be replaced by copper. Testing is recommended	To be addressed in standard renovation work	--
Asbestos	Plans are to remove or encapsulate all asbestos piping boiler insulation and other asbestos containing materials associated with boiler replacements	To be addressed in standard renovation work	--
Radon	No proposed improvements. Testing is recommended	To be considered	--
Pets	Management plan is recommended	No pets is PPL policy	--

Additional Fundraising At this time we are not recommending including the air to air heat exchanger or the central vacuum system. Additional fundraising of \$ 11,000.00 to \$ 14,000.00 will be needed to incorporate the added expense for the sealed combustion boilers and the direct venting of the hot water heaters.

Carbon Monoxide

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Boilers	New standard efficiency boilers in 6 or 7 out of 8 buildings	New high efficiency, sealed combustion boilers in all buildings. (Heil-Mclain "Gold GV")	2	\$500 to \$800 per boiler cost increase \$5,000 to \$8,000, additional funds required
Water Heaters	New standard efficiency hot water heaters in 75% of the units	Direct vent or electric hot water heater in all buildings (A.O. Smith "Sealed Shot")	3	Allow \$300 per direct vent water heater \$6,000 for 20 units, additional funds required
