



CE13-04E

## Tools for Community Engagement



# Reducing your Environmental Footprint

## Opportunities for Owners

# The Guide

## Acknowledgements

We would like to extend our gratitude to the following partners, without whom this project would not have been possible.

Ecosquad Initiative - Municipal Westmount Association

Making Megaprojects Work for Communities - Community University Research Alliance (CURA)

Hydro Westmount

Making Megaprojects Work for Communities is supported by the Social Science and Humanities Research Council - Community University Research Alliance (SSHRC-CURA) grant no. 833-2007-1009. awarded to principal investigator Lisa Bornstein.

## Cite as:


Nevajda, Milan and Cutts, Adam. (2013). "Reducing your Environmental Footprint: Opportunities for Owners - The Guide." Tools for Community Engagement CE13-04E. Montréal: CURA Making Megaprojects Work for Communities - Mégaprojets au service des communautés.

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# Tips for Owners



Decades of technological advancement and improved know-how about energy, water, heat, air, and other systems in residential properties provides homeowners with **myriad options for reducing their environmental footprint**. Property owners can also contribute to the local neighbourhood through landscaping and other features derived from **Low Impact Development** principles. The following section covers low-, medium-, and high-investment strategies for improving the sustainability of your property.

# Air Leakage in Your Home

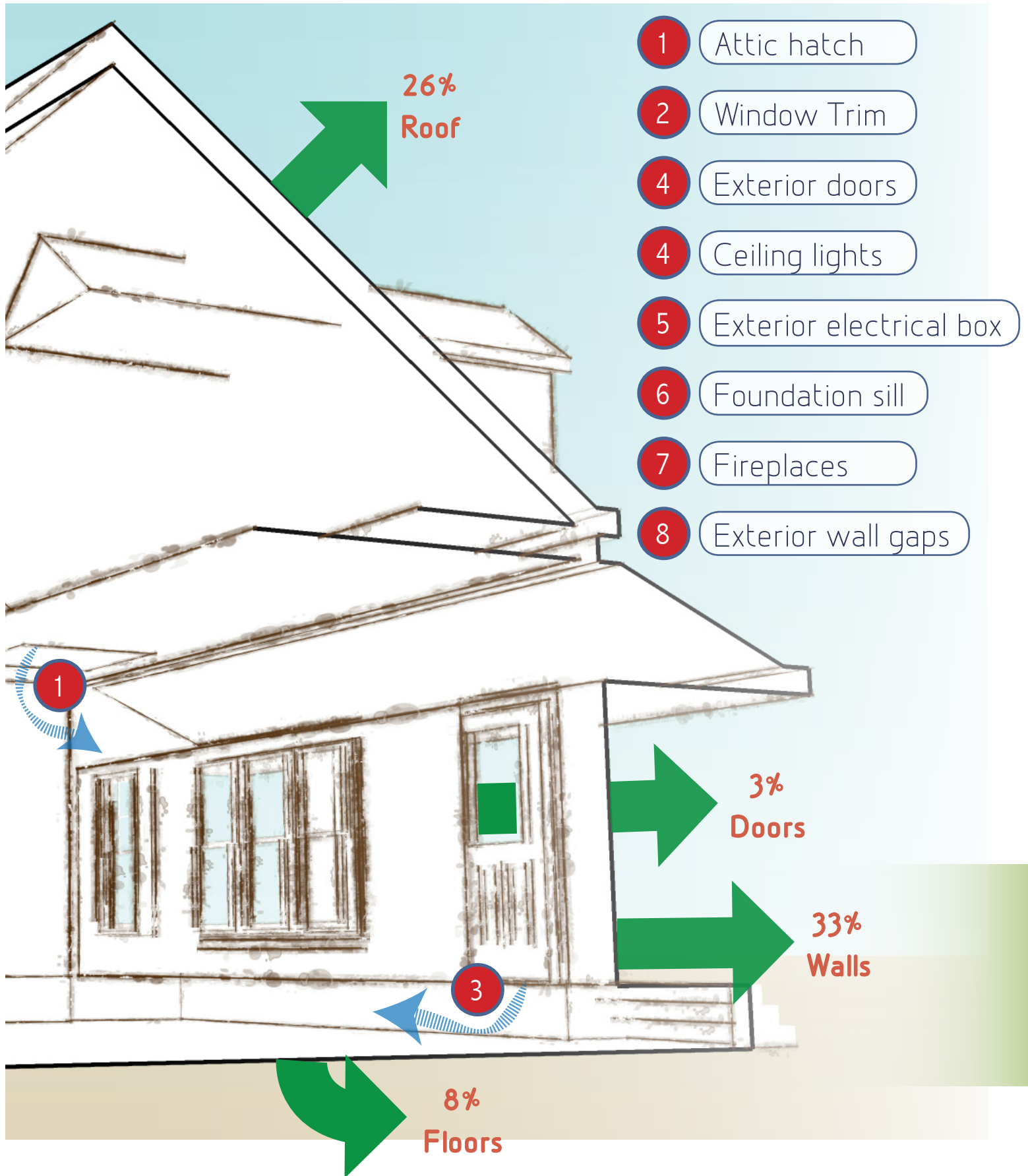
12%  
Ventilation  
& Draughts

18%  
Windows

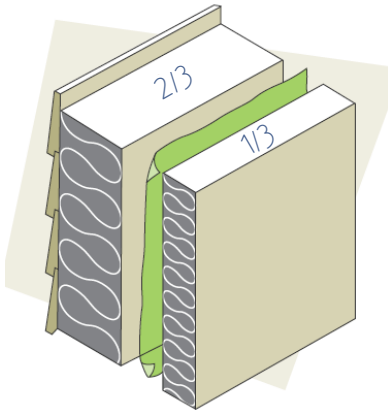




# Air Leakage in Your Home



# Understanding Insulation



Up to 1/3 of the insulating value can be installed on the warm side (interior) of the vapour barrier in your home's envelope.

## Insulation

- » Insulation is measured by an imperial unit R-value, or a metric RSI-value that indicates the material's ability to resist heat flow.
  - > Higher values mean more insulating power
  - > **Conversion:**  $R\text{-value} \div 5.678 = RSI\text{-value}$  i.e.  $R20 \div 5.678 = RSI\ 3.52$
- » Insulation quality degrades if air is moving through or around it, so it is critical to seal air leaks

### Recommended minimum insulation values

House component	Metric (RSI) or Imperial (R)	Nominal insulating value
Walls	RSI	4.2
	R	24.0
Basement Walls	RSI	3.3
	R	19.0
Roof/Ceiling	RSI	8.8
	R	50.0
Floors (over unheated spaces)	RSI	5.5
	R	31.0

Source: Natural Resources Canada. (2012). *Keeping the Heat In*

### Types of insulation for your home

Type of Insulation	Pros	Cons	Best For...
<b>Batt or blanket</b>	Easy to install and non-combustible	Does not provide an air seal Does not fully conform to space cavity	Accessible, vapour sealed areas
<b>Loose fill Insulation</b>	Inexpensive, but not suitable for basements due to moisture. Loose fill insulation tends to settle, leaving gaps at the top of cavities		
Cellulose fibre	Fills irregular cavities Air sealing benefits when tightly packed ( $>56\text{kg/m}^3$ )	Creates dust Significant settling	Irregular cavities, attics, walls, floors, roofs
Glass fibre	Non-combustible options available	Difficult to fill irregular cavities unless tightly packed ( $>40\text{kg/m}^3$ )	Open horizontal spaces
Mineral fibre	Suppresses dust and is non-combustible		Attics, walls roofs, floors
<b>Rigid Board Insulation</b>	Interior installations must be covered with a fire resistant material. Boards are easy to cut and shape but will not fill irregular cavities		
Expanded polystyrene	Moisture resistant		Below-grade exterior
Extruded polystyrene	Can function as an air and vapour barrier if joints are properly sealed		Below-grade exterior
Mineral fibre boards	An effective drainage layer		Below-grade exterior
Polyurethane & polyisocyanurate	Can function as an air and vapour barrier if joints are properly sealed	Must be protected from sunlight and water	Tight spaces where a high insulating value is needed
<b>Spray Foam</b>	Must be covered by a fire resistant material (1/2" drywall) and protected from sunlight. A 24-hour curing process is needed. Spray foam will lose insulation value over time		
Closed-cell polyurethane	Can function as an air and vapour barrier if joints are properly sealed	Significant expansion (24-38x) means it is not suitable for tight spaces Relatively expensive	Basements Any location but costly
Open-cell polyurethane	Expands to 100x original volume, fills cavities better Cheaper than closed-cell foam	Not a vapour barrier	
<b>Cementious Foam</b>	Non-combustible	No vapour barrier and a long curing period	Similar to spray foam
<b>Reflective bubble foil</b>	Designed for warm-hot climates, not suitable for Canada. Near-zero RSI or R value		

Source: Natural Resources Canada. (2012). *Keeping the Heat In*

# Air Leakage and Insulation Improvements



## Doors

- » Install a door sweep to seal the gap between the bottom of your door and the threshold
- » Apply caulking around door frames and weather-stripping around sliding doors

## Window Pelmets

- » Install pelmets or covers atop your curtains to prevent convection currents and heat loss
- » Ask your landlord to install permanent pelmets or use a towel, blanket or thick cardboard for temporary insulation - make sure not to affect exterior view of the window.

## Window Curtains

- » Heavy, lined curtains insulate over the winter and prevent window heat gain over the summer
- » Make sure they are close fitting, hang to the floor, and overlap window edges.
- » To optimise daylight:
  - > In winter, only open curtains on sun-facing windows during sunny days
  - > In summer, only open curtains on windows not receiving direct sunlight

## Window A/C Units

- » Be sure the window unit fits tightly in the window
- » Insulate room air conditioners from the outside over winter
- » Use tight-fitting unit covers available at home improvement centres

DIY: [http://www.ehow.com/how\\_6085077\\_winterize-window-air-conditioners.html](http://www.ehow.com/how_6085077_winterize-window-air-conditioners.html)

## Fireplace Damper

- » A chimney is designed to create a suction draft to remove smoke. Close the flue to avoid drafty apartments and warm/cool air loss.
- » Remember, you shouldn't close up ventilation outlets in a house with un-flued gas heaters.

## Basements and Renters on Ground Units

- » The rim joist is where basement wall cement or stone contacts the wooded house frame
- » Where accessible, seal the perimeter with expanding foam or caulk.
- » Seal any wall penetrations, such as piping and wiring between the basement and main floor.

## Envelope Penetrations

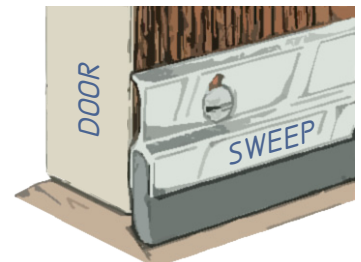
- » Vents, ducts, plumbing stacks, and electrical boxes often have gaps around them that leak air
- » Seal gaps with caulk and holes up to 3 inches in diameter with spray foam.
- » Cover spaces larger than 3 inches with a piece of foam board and seal with spray foam.
- » To save energy and reduce drafts, use spray foam or caulk to seal holes around penetrations, such as pipes, wiring, vents or recessed lights, that go through the home to the outside, attic, crawlspace, or an unfinished basement.



Window pelmets



An A/C unit jacket will prevent drafts in winter

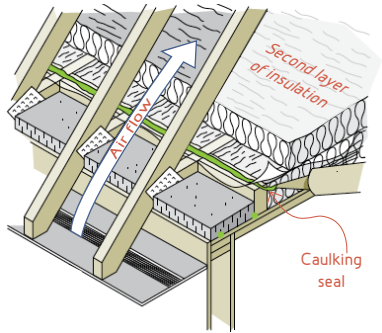


Door Sweep

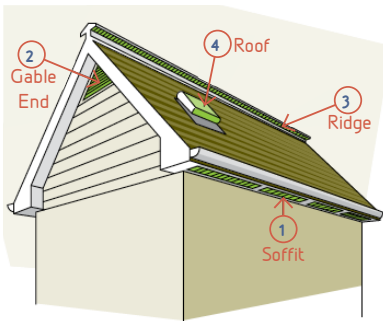


Rim joists are a source of air leakage

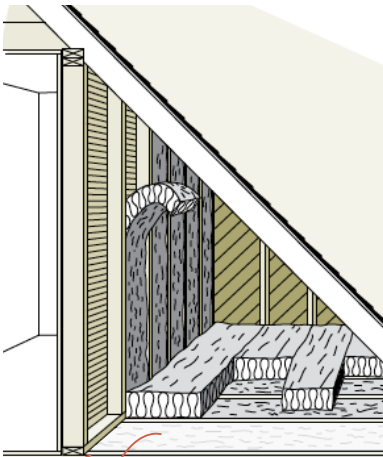
# Air Leakage and Insulation Improvements



Installing a polyethylene vapour barrier in your attic



Types of roof venting



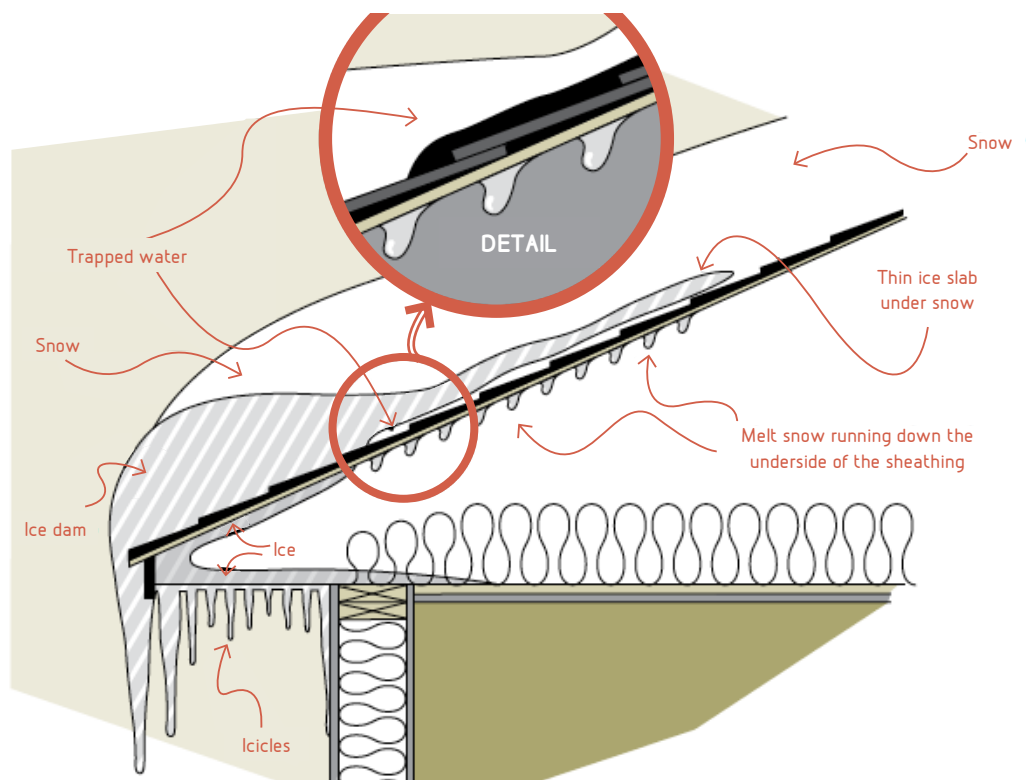
Knee wall leakage hot-spot

## Roofs and attics

- » Paint walls of rooms abutting the attic with two coats of oil-based paint or one coat of latex vapour-barrier paint
- » Seal your attic with polyethylene plastic over top of or between ceiling joists and layer more insulation above it for an air and vapour barrier
- » Ensure that batt insulation is tightly packed, even around cross bracing, and that ventilation air flow channels are unobstructed
- » Ideally, 50% of the attic ventilation openings should be continuous **soffit** vents, and the other 50% gable, ridge or roof vents
- » Half-storey attics often leak indoor air through the ceiling joists beneath the knee walls
- » Proper ventilation and vapour barriers are critical in attics to avoid moisture and ice dams
  - › Highly insulated and uninsulated attics rarely cause ice dams, improperly insulated roofs will create dams
  - › Cathedral ceiling roofs are a challenging feature for preventing ice dams because of the restricted space. Contact an insulator with dense-pack insulation experience.

## Basements

- » Before renovating your home basement, assess its status:
  - › Water leaks - Major leaks must be corrected, usually by excavating, then waterproofing. minor leaks may be corrected by directing water away from the home or patching the foundation
  - › Dampness - may result in mould, peeling paint, efflorescence, spalling, and odours. Check the dampness of your basement by taping a plastic sheet to your basement walls and slab. After two days check if water has collected above or below the plastic indicating high interior moisture levels or ground-source moisture, respectively.





# Air Leakage and Insulation Improvements

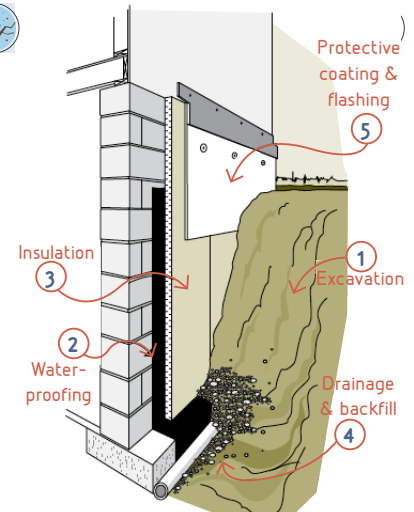


## Basements continued...

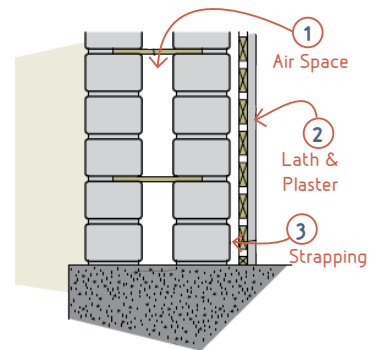
- » Insulating your basement from the outside is best, but costly and potentially more difficult.
  - » **Insulating inside** - Choosing this method depends on whether moisture and air barriers are needed, how the space is used and the cost of the upgrade.
  - » **Insulating outside** - This method involves excavating around the foundation, waterproofing and installing insulation. The better option, but more expensive
- » **Rubble or irregular basement walls** - Exterior insulation is most advised, but the interior can be insulated if there are no moisture or water problems
  - » Do not exceed RSI 2.1 when insulating from the inside as there is a risk of damaging the foundation through freeze-thaw cycles.
- » **Cold cellars or an unheated garage** - insulate these spaces from the heated portions of the basement, treating their walls as if they were exterior basement walls.

## Insulating Walls

- » There are generally three types of wall construction in Westmount:
  - » **Solid walls** - Do not have a cavity that can be insulated, and should therefore be sealed and insulated from the interior or exterior. Never insulate the drainage plane or cavity that many, especially double-brick, solid walls have.
  - » **Concrete block** - Usually have hollow cores for air circulation that increase convective heat loss. Insulate from the from the interior or exterior and cap the top of the blocks.
  - » **Frame walls** - have a cavity for insulation that varies in thickness depending on the type of construction method used. Be mindful of insulation obstructions within the cavity (plates, fire stops, plumbing, wiring, ducts, etc.).
- » Blown-in insulation can be added to wall cavities through drilled holes that provide access to the wall cavity. When negotiating with a contractor, define the manufacturer's recommended density levels for the insulation, verify that these densities will be achieved and confirm how the wall repairs will be completed. Access to the wall cavity is gained from the:
  - » **Interior** - small holes are drilled into the interior wall finish and plugged
  - » **Exterior** - siding or bricks are removed to inject insulation
  - » **Basement/attic** - often the easiest method if cavities are exposed at the top or base
- » Greater insulation can be achieved by building new walls on the inside/outside of existing walls
  - » see below:

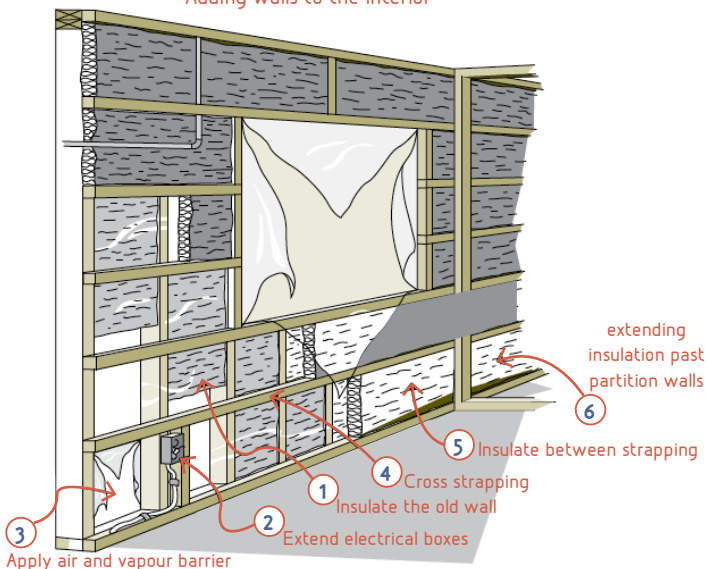


Components of exterior insulation

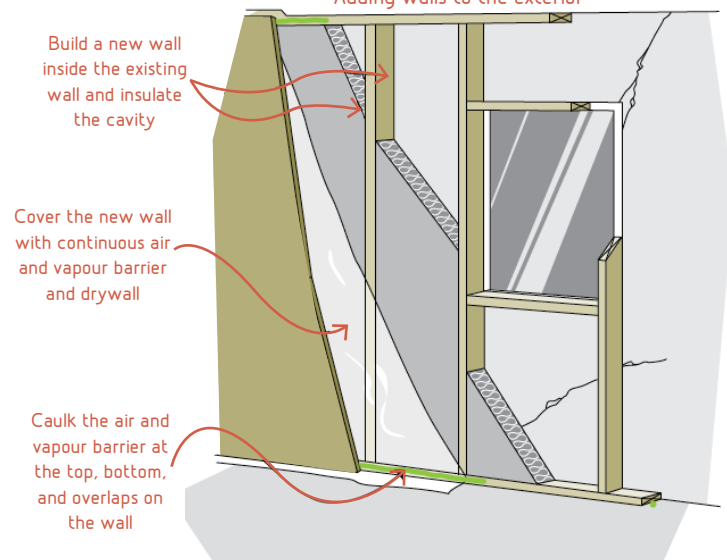


Double-brick wall with drainage cavity

Adding walls to the interior



Adding walls to the exterior



# Air Leakage and Insulation Improvements



## Windows

» To preserve and enhance the architectural beauty of the City of Westmount, there are important guidelines to follow when upgrading your windows to more efficient products. Your first step is to consult with the Westmount Urban Planning Department on your options and guidelines relevant to your property.

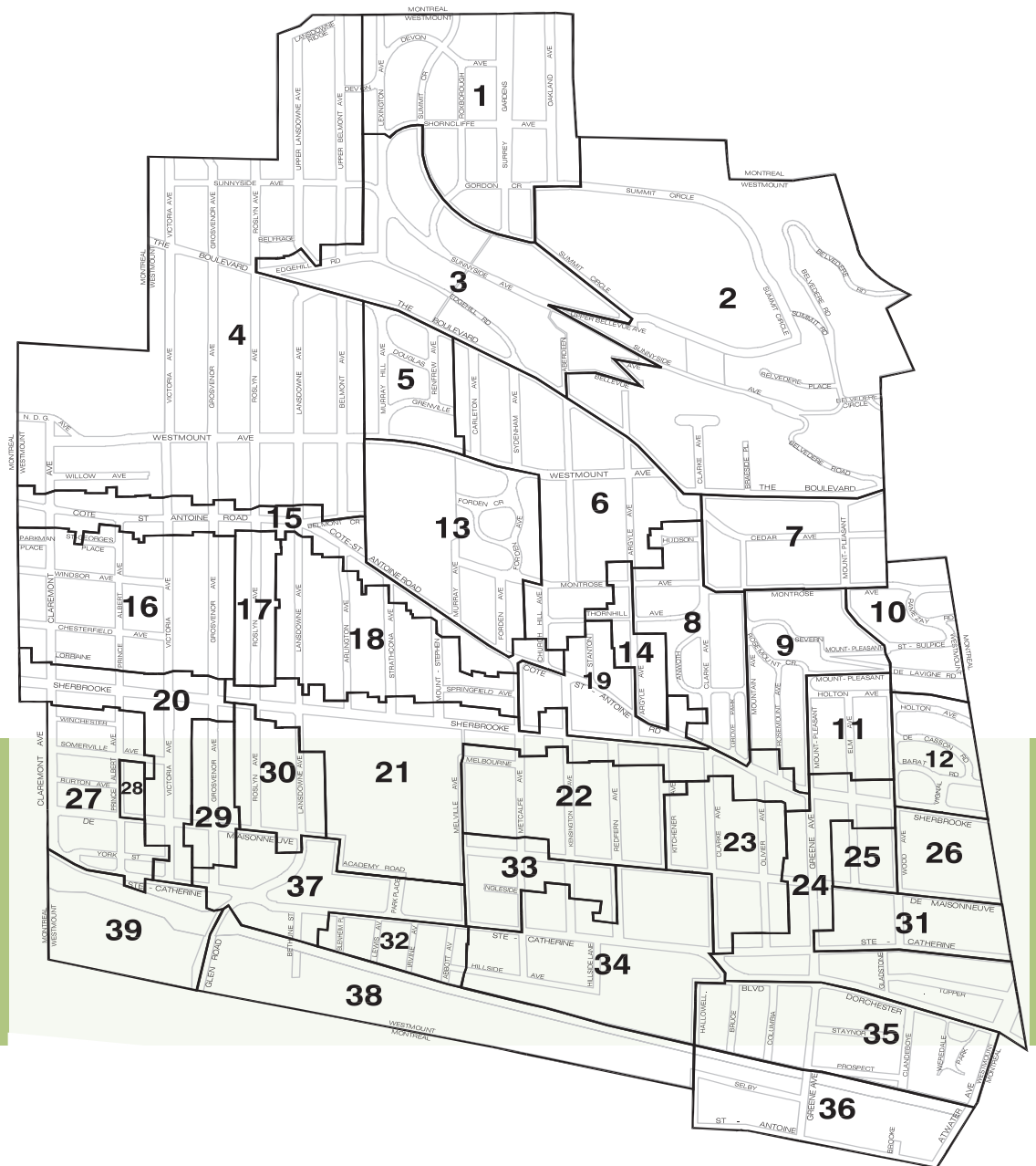
» The **Character Areas** map below identifies the architectural and design area guidelines relevant to your home. Details on each Character Area can be accessed online at:

<http://www.westmount.org/page.cfm?Section.ID=6&Menu.Item.ID=51>

» **Window and door guidelines** are available at:

[http://www.westmount.org/pdf\\_files/UP\\_guidelines.e/4-Windows.and.Doors.pdf](http://www.westmount.org/pdf_files/UP_guidelines.e/4-Windows.and.Doors.pdf)

1. Vicinity of St. Joseph's Oratory
2. Westmount Mountain
3. Sunnyside and Edgehill Road
4. West of the Mountain
5. Douglas and Grenville
6. Aberdeen and Vicinity
7. Cedar Avenue and Vicinity
8. Clarke Avenue and Vicinity
9. Rosemount
10. Saint Sulpice and Ramezay
11. Holton Estate
12. Priest's Farm
13. Forden and Murray Park
14. Argyle Avenue
15. Côte Road
16. On the Hurtubise Farm
17. Roslyn Avenue
18. South of Murray Park
19. Vicinity of City Hall
20. Victoria and Sherbrooke
21. Sherbrooke and Westmount Park
22. The Mansions of Lower Westmount
23. Vicinity of St. Leon's Church
24. Greene and St. Catherine
25. Wood & Elm Street, below Sherbrooke
26. Dawson College
27. Somerville Area
28. On site of the Old Bakery
29. Grosvenor Avenue
30. Lansdowne and Roslyn, below Sherbrooke
31. The Towers of Westmount
32. Vicinity of Blenheim Place
33. De Maisonneuve near Westmount Park
34. Around Westmount High
35. Hollowell-Weredale
36. St. Antoine Street
37. Around Park Place
38. Vicinity of Glen Yards
39. Glen Yards



# Tips for Owners

## Lighting



### Switch to Compact Fluorescent or LED Lights

- » Compact fluorescent lights (CFLs) give high-quality light with 75% less energy.
- » Incandescent bulbs are only about 10-15% efficient, the rest 85-90% is emitted as heat.
- » Incandescent bulbs can pose safety risks: paper will burn if in contact with a 60W bulb for 20min
- » CFLs & LEDs can limit blue light emission to reduce eyestrain and fatigue (especially at night).
- » Replace halogen downlights with quality LED bulbs to save on energy use

### Turn Lights Off When Leaving a Room

- » Turning lights on and off reduces their life-span and increases replacement costs:
  - > **Incandescent** - highly inefficient - Energy savings from turning lights off is much greater than the cost of replacement, so always turn off your incandescent lights
  - > **Fluorescent** - efficient - These are more expensive and more sensitive to on/off switching. A general rule of thumb: turn off fluorescents if leaving a room for >15min
  - > **LEDs** - highly efficient - LED light sources are "switch" friendly. Turning them on and off actually extends their lifespan

### Optimise Natural Light

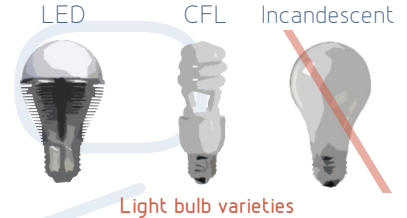
- » Open blinds and curtains to maximize sunlight, this will also reduce indoor pathogens

### Install Automatic Lights

- » Lights with sensors to ambient light will reduce energy use in bright conditions
- » Motion sensor lighting will increase convenience and can reduce unnecessary energy use

### Keep Lighting Fixtures Clean

- » Dirt absorbs light so a clean bulb or fixture produces more light.
- » Cleaner windows will also allow more light into a house



Cost Comparison: Incandescent, CFL, & LED Bulbs

	60W Incandescent	15W CFL	12W LED
Energy Saved (%)	-	75%	75-80%
Annual Energy Cost (\$)	\$4.80	\$1.20	\$1.00
Bulb Life (hours)	1000	10,000	25,000

\*Based on 2 hrs/day of usage, and electricity rate of 11 cents per kilowatt-hour

## Thermostats



### Replace Mechanical Thermostats with Electric Models

- » Because they are less sensitive to room temperature, old mechanical thermostats fluctuate by 2-5°C from your desired temperature
- » Electronic thermostats provide a more constant temperature, greater comfort, and can save you up to 10% in heating costs.
- » Buy thermostats according to your lifestyle: 5-2 thermostat models divide the week into weekdays and weekends, while 5-1-1 models separate Saturdays and Sundays programming

### Lower Your Preset Temperature

- » Your body feels cold very strongly through your feet - wear thick socks and slippers in winter
- » Lowering nighttime temperature settings by 3°C can save up to 6% in heating costs
- » Programmable thermostats make presetting temperatures easy

### Heat and Cool Only What You Need

- » Only heat or cool rooms you are using, and keep doors closed to save on heat/cold loss

### Modify Temperature Settings Gradually

- » Quickly raising your heat pump setting will activate its heat strip, which uses a lot of energy



# Tips for Owners

Measure the flow rate of your shower head:

Turn on the shower to its "normal rate" and capture 30 seconds of water flow into a bucket.

Measure how many litres of water are in the bucket and double that figure. inefficient showerheads can use more than 15 litres per minute

## Water Conservation



### Shower heads

- » Using a low-flow shower head (about 2.5 gallons/minute) and showering for 10min will save you five gallons of water over a typical bath.
- » New showerheads also save energy by reducing water heating needs

### Laundry

- » Wash your laundry with cold water - only very oily stains need hot water
  - > Hot water washing accounts for ~90% of laundry machine energy use
- » Washing full loads can save more than 12,800L of water each year
- » Air dry your clothes on an outdoor clothes line or hang on a clothes rack indoors.
  - > In winter indoor air drying can also help with dry, uncomfortable air in your home.

### Dishwashing

- » Save water by scraping dishes instead of rinsing them before loading in the dishwasher.
- » Run your dishwasher with a full load and use the air-dry option if available
- » Save rinsing water by using after-wash to water plants or to refill toilet tanks

### Faucet Taps

- » Dripping taps waste a lot of water - install new washers to fix your leaks
- » Aerators reduce water flow while maintaining pressure

*Subsidies are available for aerators - see the financial support section*

### Toilets

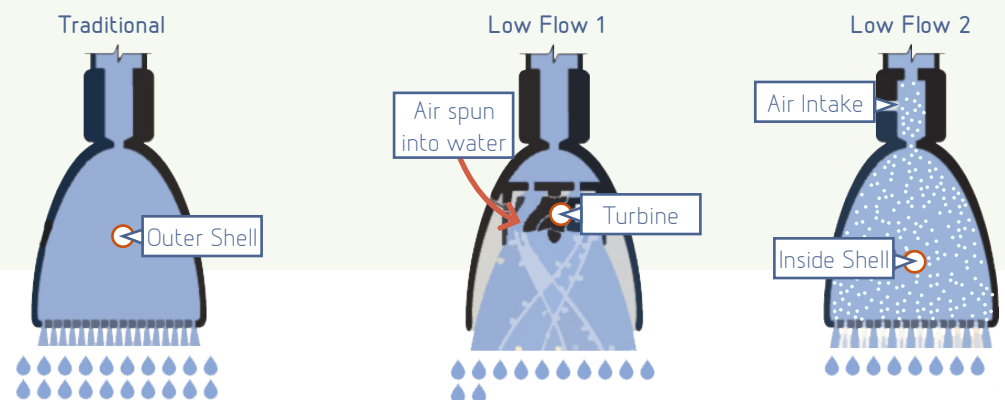
- » Fix leaks: to check for leaks add biodegradable food colouring to your toilet tank. If the colouring appears in the toilet bowl before flushing, your cistern is leaking
- » Replace toilets with high-efficiency rated models
- » If you have a single-flush toilet, place 1-2 full water bottles in the tank to reduce water use

Hot water leaking at one drip/second can waste up to 1,661 gallons of water per year!

Ideally, the comfortable and healthy range of relative humidity in your home is between 30% and 50%

8-minute shower

1 gallon



# Tips for Owners

## Ventilation



### Heating Vents

- » Make sure all air registers are clear of furniture so that air can circulate freely.
- » If your home has radiators, place heat-resistant reflectors between radiators and walls
- » If your home has central heating consider vent directors to help circulate air from vents to the centre of the room instead of to the ceiling

### Heating and Cooling Ducts

- » Repair leaky ducts to reduce heating and cooling costs

### Bathrooms

- » Vent fans control moisture, mold, and mildew. Run your fan for 15min after showering.
- » Efficient fans can use up to 60% less energy than standard models

### Ceiling Fans (with or without lighting)

- » In winter, reverse the fan motor to push air upwards - this will move warm ceiling air downward.
- » In summer, direct the fan to blow downward to help you feel cooler
- » Increasing your thermostat by 2°C and using your fan can lower A/C costs by 14% annually.
- » Ceiling fans only cool people, not the room, so turn them off when you leave the room.

## Appliances & Electronics



### Consumer Electronics

- » Many electronics use energy when off - up to 10% of your energy bill in fact!
- » Unplug any battery chargers or power adapters when not in use (like your cell phone charger).
- » Make it simple by connecting multiple appliances to one power strip that can be flipped off.
- » Turn off computer monitors when not in use, and program the automatic "sleep function"
- » LCD computer monitors emit half as much greenhouse gases as conventional monitors

### Refrigerator and Freezer Units

- » If your current refrigerator was made before 1993, it uses twice the energy as new models.
- » The appropriate temperatures for refrigerators are 3°C to 5°C, and freezers: -15°C to -18°C
- » Ventilate your fridge: Provide at least 5cm of space around the top, back, and sides of your unit
- » Place fridges and freezers in cool spots, away from sunlight and heat sources (e.g. stoves)
- » Check and clean seals on your refrigerator/freezer and regularly remove frost buildup
- » Keep your freezer full to use less energy. Consider filling your freezer with water containers

### Stoves

- » Use the right sized pot on your burners: a 6" pot on an 8" burner wastes over 40% of the heat
- » Cover your pots and pans with lids to cook more efficiently and keep your kitchen cooler
- » Use an electric kettle instead of the stovetop for boiling water

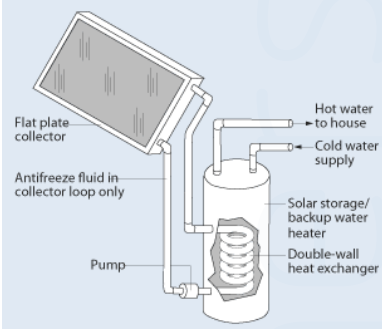
### Water Heaters

- » You can improve the efficiency of old water heaters by wrapping it with an insulating jacket
- » Insulate your hot water piping to keep it warm on its way to the tap
- » Reduce hot water demand by using cold water for hand washing, shaving and brushing teeth

OWNERS

# Tips for Owners

Active, Closed Loop Solar Water Heater



Active solar hot water collector system  
Image source: U.S. Department of Energy

## Choosing a water heater for your home:

	Conventional Storage	Tankless	Heat Pump	Solar	Tankless Coil & Indirect
<b>Cost</b>	\$	\$\$	\$\$	\$\$\$	\$\$
<b>Lifespan</b>	10-15 years	20+ years	10-15 years	~20 years	10-11 years
<b>Efficiency vs. Storage</b>	-	8-34% more efficient	2-3 times more efficient	50% more efficient	-
<b>Pros</b>	Low cost	Constant supply >\$100 annual savings	~\$300 annual savings Dehumidification in the summer	Infrequent maintenance needed Low energy cost	Low installation and maintenance cost
<b>Cons</b>	Standby heat loss	Limited flow rate Limited cost savings	Performance depends on install location Exhausts cold air	Requires a backup heating supply	May be an inefficient choice for residential use
<b>Tips</b>	Insulate your tank Flush 1L of water monthly Replace anode rods as needed	Install multiple units or install dedicated tankless heaters near points of use	Resistance mode will lower cold air exhaust, but also the efficiency	Purchase a storage water heater as a bundle package	
<b>Fuel Type</b>	Electric Natural Gas Fuel Oil Propane	Electric Natural Gas Propane	Electric Geothermal or Ground-source Natural Gas	Solar	Electric Natural Gas Fuel Oil Propane

Source: US Department of Energy. (2012). *Energy Saver 101 Infographic*

## Heating Systems

### Heating Appliance Care

- » Change the filters in your heating system every month for optimum efficiency.
- » Expose you heating system: do not stack materials against or atop your HVAC unit

### Active Solar Heating (ASH)

- » ASH heats a fluid (air or liquid) by solar energy and uses it for space heating or heat storage
- » It is usually most economical to design a system to provide 40-80% of the heating need
- » Speak to the City Planning office to investigate local building codes, zoning ordinances, and subdivision covenants before construction

## Cooling Systems

### Air Conditioners

- » Change or clean AC air filters month to optimise system performance
- » Opening interior doors will allow cooled air to circulate throughout the home
- » Ensure your unit has a Seasonal Energy Efficiency Ratio (SEER) of 15
- » ENERGY STAR qualified models use AT LEAST 10% less energy

More information: [www.mge.com/images/PDF/Brochures/Residential/AirConditioners.pdf](http://www.mge.com/images/PDF/Brochures/Residential/AirConditioners.pdf)



# Tips for Owners

## Low Impact Development



Low Impact Development (LID) enhances the infiltration and retention capacity of ground cover to help with stormwater management, improve water quality, maintain a balanced hydrologic cycle, and contribute to the natural environment.

By collecting runoff and meltwater, slowing down their flow, enhancing their infiltration into the ground, and providing dense vegetation to increase evapotranspiration of hydrological inputs, watershed ecosystems eliminate many problems caused by runoff.

You must check with the City Planning Department before building green infrastructure as there are important bylaws and regulations to be followed to ensure safe, appropriate, and acceptable LID design and construction standards.

### Permeable Surfaces

- » Reduce the rate and volume of water and pollutants reaching local streams
- » Improves traffic safety by increasing skid resistance and reducing hydroplaning risk
- » Prevents downstream erosion and storm-drain surges

### Bioretention Cells (Rain Gardens)

- » Cells can be wet or dry systems:
  - > **Wet** – simulate aquatic ecosystems
  - > **Dry** – deeper retention cells allow for rapid water infiltration and dry ground conditions
- » Three designs are possible:
  - > Without an underdrain for full infiltration
  - > With an underdrain for partial infiltration
  - > Lined with impermeable materials with an underdrain for filtration (a biofilter)

### Bioswales

- » Proper design and construction ensure that swales exfiltrate within 24-48 hours, thereby eliminating water-borne pest concerns
- » Design Considerations include:
  - > Length of the swale
  - > Cross-sectional shape and slope
  - > Type of vegetation
  - > Infiltration rate of the soil

### Green roofs

- » Reduces the runoff from your roof based on soil depth, roof slope, and rainfall levels
- » A conservative runoff reduction rate estimate for a healthy roof is 45 to 55% water reduction
- » In Westmount "green roofs, if permitted by applicable bylaws and codes, are permitted on flat roofs of all buildings." Check with the City Planning Department before constructing

[http://www.westmount.org/pdf\\_files/UP\\_guidelines\\_e/3-Roofs.pdf](http://www.westmount.org/pdf_files/UP_guidelines_e/3-Roofs.pdf)

### Living Walls

- » Provide a water management and filtration system in very dense spaces.
- » Living walls channel water through pipes filled with porous soil and a variety of vegetation
- » Bacteria in the piping help remove pollutants from runoff water while reducing runoff.
- » Living/green walls are an excellent replacement for traditional downspouts
- » When constructed against buildings, they can shade the building and reduce cooling demand



A permeable pavement option



Curbside rain garden design



Curbside bioswale



Green roof on a shed



Living wall system

# Tips for Owners

## Owners

### Performing the work yourself:

- » Be careful when working with tools and products, and follow the manufacturer's safety directions
- » Wear appropriate protective equipment and clothing
- » Protect the rest of your home from dust, debris and contaminants
- » Be cautious about vermin, droppings, mould, lead, asbestos, and vermiculite insulation that may contain amphibole asbestos or other hazardous products

### Hiring a contractor:

- » Seek out at least three quotes, ask for proposals in writing, and insist on a written contract
- » Questions to ask to get to know your contractor:
  - > How long have you been in business?
  - > What work are you, or your subcontractors, licensed to do?
  - > What kind of work do you specialize in?
  - > Have you done a similar job before?
  - > Will you use your own crew or will you subcontract the work?
  - > What challenges do you expect on this project?
  - > How will you deal with the health and energy efficiency aspects of the job?
  - > How and when do you clean up, particularly fine dust?
  - > What work schedule will you follow?
  - > What kind of warranty do you offer and what does it cover?
  - > Do you carry workers' compensation and liability insurance?
  - > Will you provide a written contract?
  - > Will you take out all required permits (e.g., building, plumbing, electrical)?
  - > Can I see the Material Safety Data Sheet for the products being used (if applicable)?
  - > Will the product be installed according to manufacturer guidelines?
  - > Are the workers trained in these the proper installation procedures?
  - > Will the work comply with all relevant legislation and utility requirements?
  - > What steps will you take to protect my family during and after the renovation?
  - > May I contact your references?
  - > Clarify the contract termination clauses (e.g., penalties, etc.)
- » Arrange for an appropriate contract structure:
  - > **Fixed-price:** a fixed price includes materials, labour, equipment and fees, plus contingencies, overhead and profit without variation after the fact
  - > **Cost-plus:** you pay the actual cost for labour, materials, equipment and agree to a percentage for overhead and profit (remember to set a maximum limit)
  - > **Design-build:** A renovator designs and carries out the whole project. You can use either a fixed price or cost-plus contract, again with a set cost limit.
- » Holdbacks
  - > **Builders Lien:** Provides protection against liens being placed against your home by subcontractors and suppliers. This allows a period of time, after the project is substantially completed, for claims to be made.
  - > **Deficiency:** It is a standard procedure to hold back a reasonable amount of money (e.g., a percentage of the project cost) near the end of a project to cover the cost for final work items.
  - > **Seasonal or Delivery:** It is possible that items cannot be completed because of seasonal factors (e.g., exterior painting, landscaping, etc.). It is standard procedure to hold back payment(s) equaling the cost of the items to be completed.

*A contractor checklist is available here:*

[www.bidmyreno.com/blog/hiring-a-contractor-advice-from-the-canadian-mortgage-housing-corporation-cmhc/](http://www.bidmyreno.com/blog/hiring-a-contractor-advice-from-the-canadian-mortgage-housing-corporation-cmhc/)

