



BUILDING ENVELOPE SCIENCE

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What's In Your Wall?

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BUILDING ENVELOPES

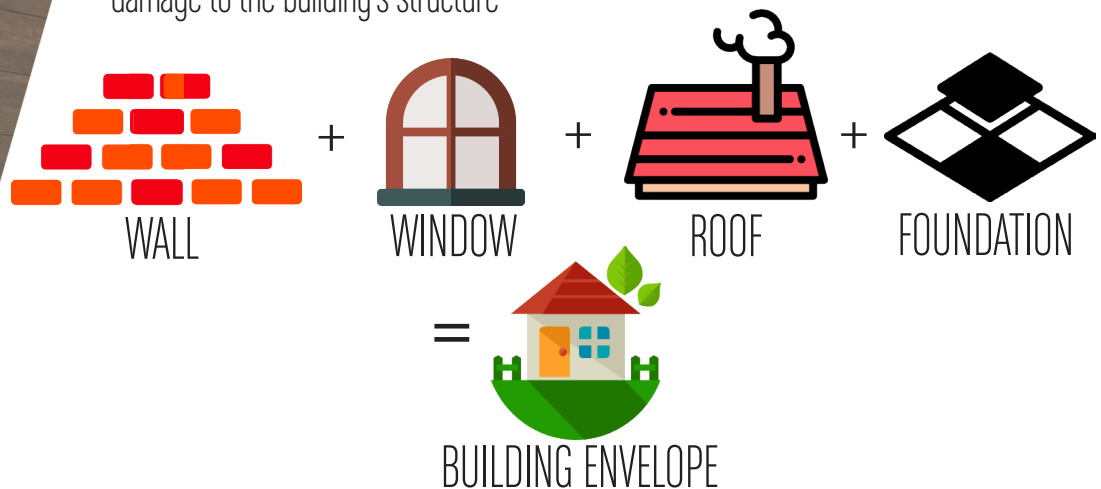
The Basics

When we think of building envelopes we often think of a set of components which serves as a barrier between the exterior and interior environments enclosing a structure. These barriers or components includes the walls, windows, roof, and foundation which are integral in controlling elements both inside and outside of a structure. Depending on the structural integrity, the building envelope will determine resistance to air, water, heat, light, and noise transfer and will mitigate damage to the building's main structure. This is important as a poor building envelope that allows water to penetrate your walls will not only lead to costly damaged structural components and mould, but can also lead to grave health concerns in the long run.

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Mould accumulation due to water penetration from building envelope



Simple illustration of a building envelope

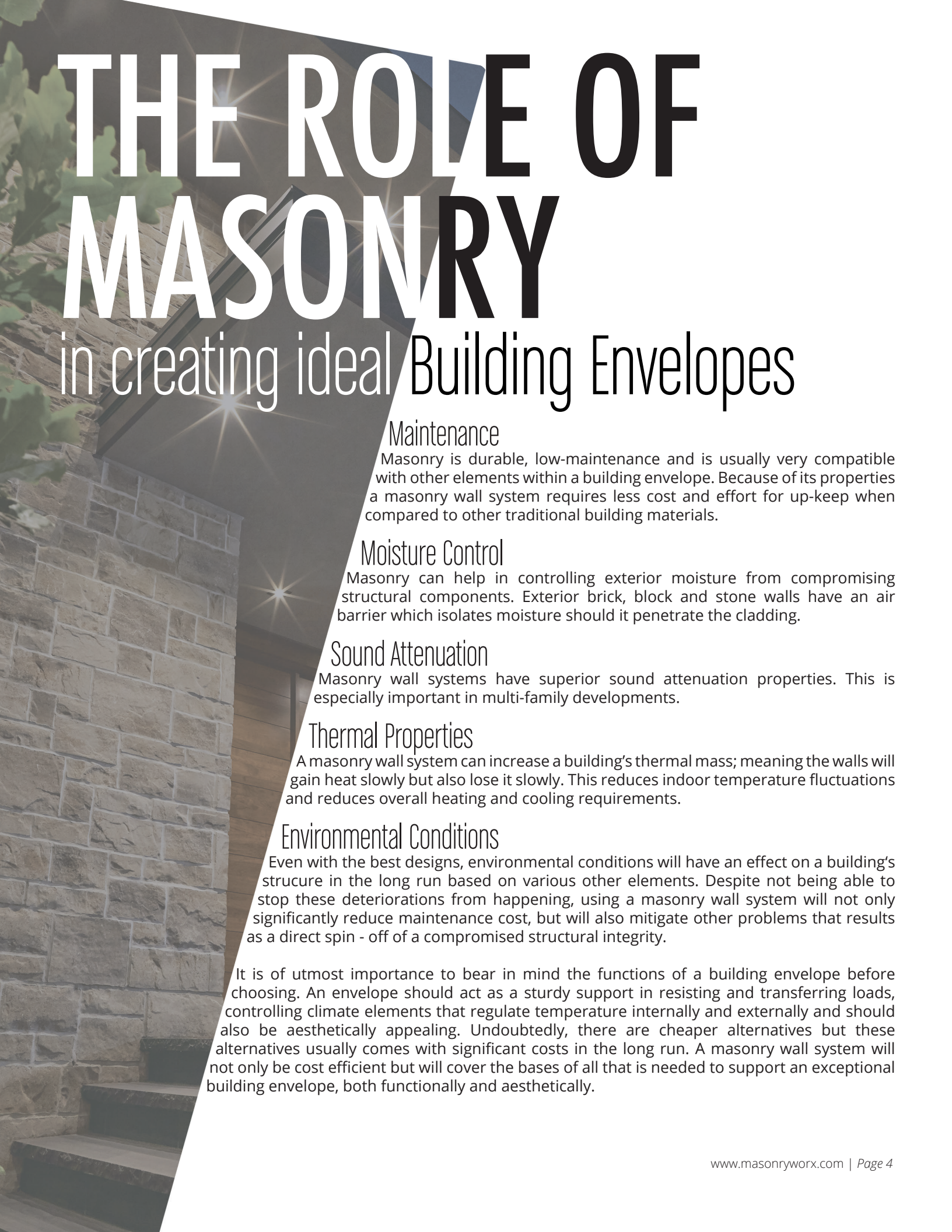


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Photo: Minto Longbranch

Mid-rise Construction

The size of mid-rise buildings results in construction that is often a mixture of commercial and residential construction techniques. This mixture of the two construction methods greatly impacts the building envelope. Residential construction typically has the watershed/air barrier (often building paper) on the exterior sheathing (plywood, OSB, or exterior grade drywall). The insulation is usually installed on the interior between the wood studs, where the wood studs can act as thermal bridges. The vapour barrier is also installed on the interior of the building where it is more difficult to provide a continuous vapour barrier because the barrier must be installed around interior structural elements and services. In contrast, commercial construction usually has a superior form of building envelope for cold climates by installing both the air/vapour barrier and insulation over the structural framing. The exterior air/vapour barrier is more easily installed as a continuous system and the insulation on the exterior provides for less thermal bridging. The exterior envelope alleviates water vapour being trapped in the insulation by exposure to the exterior environment where it can dry and by often using rigid hydrophobic extruded polystyrene type insulations. When the two systems are integrated it requires a thorough understanding of building envelope principles and a superior attention to detail by the installers to ensure the building envelope is properly lapped and the transition is adequately sealed. The transition between the two systems has been found to be improperly lapped with increasing frequency. Untreated wood sheathing unlike concrete or masonry does not have the ability to store moisture without degradation in the form of mould and rot. Architects favouring clean lines often specify parapet flashing with tiny drip edges which results in watershed down the walls of the taller buildings, especially in wind driven rain events. As a result, the walls of a mid-rise multi-family residence are subjected to a much larger environmental load than a single family residence. If gaps in the building envelope do exist at the intersection of the two construction methods, moisture ingress through the wall system is intensified. On wood stud, wood sheathed wall systems can accelerate mould and rot. This is why it is important to incorporate a wall system which will protect less durable structural elements should they be specified in the building.



THE ROLE OF MASONRY

in creating ideal Building Envelopes

Maintenance

Masonry is durable, low-maintenance and is usually very compatible with other elements within a building envelope. Because of its properties a masonry wall system requires less cost and effort for up-keep when compared to other traditional building materials.

Moisture Control

Masonry can help in controlling exterior moisture from compromising structural components. Exterior brick, block and stone walls have an air barrier which isolates moisture should it penetrate the cladding.

Sound Attenuation

Masonry wall systems have superior sound attenuation properties. This is especially important in multi-family developments.

Thermal Properties

A masonry wall system can increase a building's thermal mass; meaning the walls will gain heat slowly but also lose it slowly. This reduces indoor temperature fluctuations and reduces overall heating and cooling requirements.

Environmental Conditions

Even with the best designs, environmental conditions will have an effect on a building's structure in the long run based on various other elements. Despite not being able to stop these deteriorations from happening, using a masonry wall system will not only significantly reduce maintenance cost, but will also mitigate other problems that results as a direct spin - off of a compromised structural integrity.

It is of utmost importance to bear in mind the functions of a building envelope before choosing. An envelope should act as a sturdy support in resisting and transferring loads, controlling climate elements that regulate temperature internally and externally and should also be aesthetically appealing. Undoubtedly, there are cheaper alternatives but these alternatives usually comes with significant costs in the long run. A masonry wall system will not only be cost efficient but will cover the bases of all that is needed to support an exceptional building envelope, both functionally and aesthetically.