



## The Benefits of Over-cladding

### **Executive Summary**

Toronto has a large number of valuable multi-residential housing buildings, many of which were built more than 30 years ago. They form the backbone of Toronto's rental housing market, and in these days of condominiums, provide a very important component to the social health of the City. Many of these buildings have reached the age where the outer brick veneer is showing signs of structural weathering and loss of integrity, even to the point of becoming a safety hazard from falling masonry, and water ingress into the building interior.

Many property owners are turning toward over-cladding using an Exterior Insulation Finishing System (EIFS) to address these structural problems, while at the same time conserving energy and improving the aesthetic appeal of the buildings. Three properties are highlighted in this paper, two in Toronto and one in Windsor, Ontario.

### **Homestead Land Holdings: 125 Parkway Forest**

One such property owner is Homestead Land Holdings. Homestead has moved to EIFS to address issues with the brick veneer in many of their buildings. These problems often manifest as degradation of the shelf angles, with subsequent water penetration and other associated damage. To date they have completed 15 buildings, and five more over-cladding projects are planned for next year. Homestead owns some 200 buildings. In some cases, the over-cladding is partial and in other cases, the buildings have been fully over-clad.

Homestead has found that properly specified, the EIFS system can solve structural problems, save energy, and present an attractive long term building facade.

### **Building Specifications:**

Construction Year:	1967	Heating Fuel Source:	Natural Gas
Number of Units:	287	DHW Fuel Source:	Natural Gas
Gross Floor Area:	27,964 m <sup>2</sup>	Cooling:	No Central Cooling. 50% have Window AC
Number of Floors:	17	Tenancy:	Mixed, Family

### **Brick Deterioration**

The brick veneer on many apartment buildings is subject to deterioration over time, both from spalling or cracking of the brick itself, and from water penetration at shelf angles and other joints. Shelf angles are used to support the brick veneer on buildings where the floor slab is not exposed. Water penetration can cause these angles to deteriorate, allowing further structural



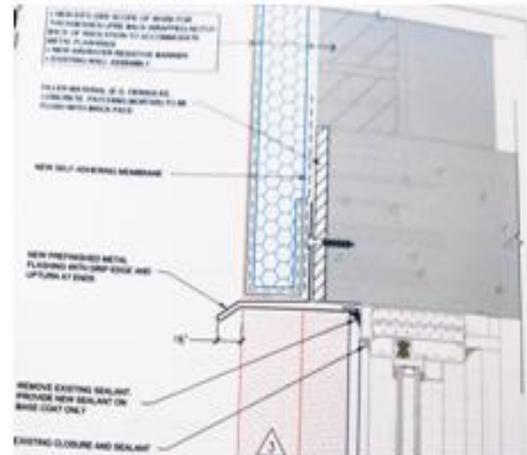
**Deterioration of brick veneer**



damage, even damaging galvanized brick ties and threatening the stability of the brick veneer. Companies such as Homestead that own or maintain older buildings must either carry out continual and costly repairs to maintain the integrity of the brick, or consider some form of over-cladding.

### The Exterior Insulation Finishing System (EIFS)

Having reviewed different forms of over-cladding, Homestead now uses the EIFS system in preference over other forms such as steel or light weight concrete panels. The choice is one of aesthetics and cost. Early EIFS installations were prone to difficulties with adhesion and water ingress, but improved systems and detailing have proven to have solved these problems. EIFS now offers an attractive solution, with a life expectancy of approximately 30 years, according to Greg Ropp of Homestead.

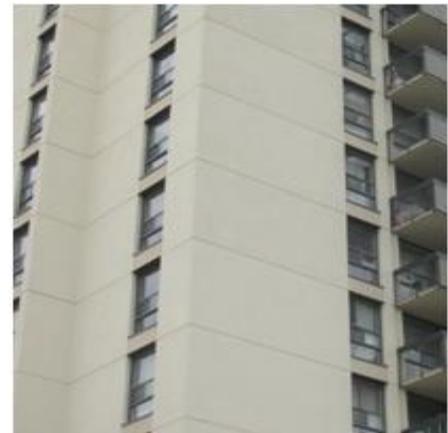


Typical detail, EIFS

Homestead has also developed a set of details for EIFS over-cladding which have proven successful over time. Their oldest installation is about 10 years old. (2004).

To determine the need for over-cladding, a process of destructive testing and investigation was used to expose water ingress and deterioration. A 3 inch Styrofoam (EPS) insulation board was used, adding about R 11 to the existing wall. Part of the process requires rasping the surface to achieve smoothness and good adhesion, and this tends to create a lot of small airborne EPS particles which go everywhere. To avoid this problem, Homestead specifications require the use of a mechanical rasping system, with a vacuum attachment to gather the waste EPS beads.

At 125 Parkway Forest, the ground floor was treated with stucco as with the other floors, however no insulation was applied, in order to protect the softer EPS substrate from abuse or damage at the ground level.



Over-cladding creates an attractive building facade

### Economics

The cost of the EIFS system falls in the \$15 to \$20 per square foot range, and by itself does not provide a fast payback against energy savings. However if we assume that part of the cost



can be written off against the ongoing maintenance costs of a failing brick veneer, and poor aesthetic appeal, then over-cladding starts to make sense financially.

If we allow an approximate 30 year life expectancy, then from the point of view of energy conservation, the cumulative energy savings will provide a significant offset to the capital cost of the project. Typically, gas savings from the 3" EPS insulation could amount to 1 m<sup>3</sup> per year of gas per ft<sup>2</sup> of over-cladding. This assumes the wall is transformed from RSI 0.7 (R4) to RSI 2.5 (R14), and based on the Toronto average winter.

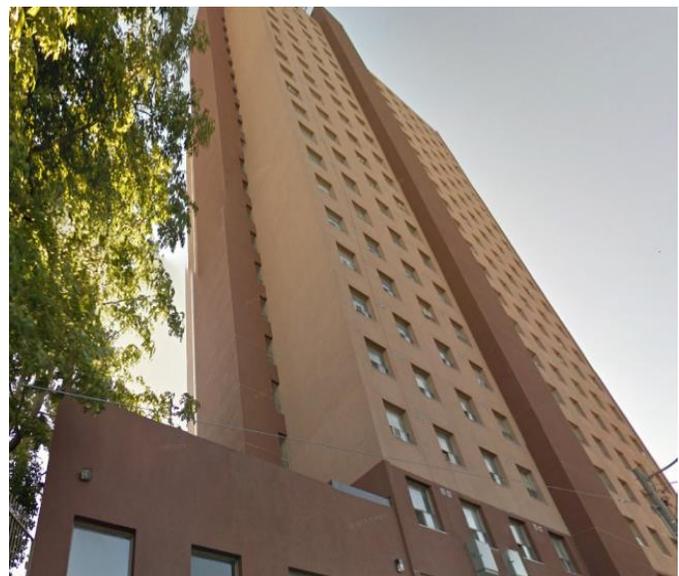
Over-cladding may be the simplest and most economical way to prolong the life and aesthetic appeal of older buildings, and an important step to reducing the carbon footprint of older apartment towers.

**1011 Lansdowne Ave. in Toronto: Building Specifications:**

Lansdowne Properties, the owners of 1011 Lansdowne in Toronto also turned to over-cladding with EIFS to address structural issues and building aesthetics.

Construction Year:	1972 (est)	Heating Fuel Source:	Natural Gas
Number of Units:	354	DHW Fuel Source:	Natural Gas
Gross Floor Area:	12,705 m <sup>2</sup>	Cooling:	No Central Cooling
Number of Floors:	22	Tenancy:	Singles, and Couples

At this site, water penetration and freeze thaw had created serious structural deterioration. Concrete pieces were actually being dislodged from the building, and water penetration was occurring into suites on the upper floors, making some of them un-rentable. In addition, the building aesthetics were deteriorating. Over-cladding was undertaken as part of an overall building restoration, including new roof insulation, elevators, windows, and upgrades to the common areas of the building. The cost of the over-cladding was \$770,000, part of a total project cost of over \$2 million





With the over-cladding complete, structural safety is now no longer an issue and suites that were cold are now comfortable. The building is fully rented, and the appearance is excellent. Although energy savings alone do not justify the over-cladding, other factors such as safety, building aesthetics and rentability easily tip the balance in favour of this solution. The property owners also found that the quality and appearance of the building can play a big role in attracting quality residents, and in fact the whole culture of the building has turned around since the renovations were completed.

### 2455 Rivard Ave in Windsor

At 2455 Rivard Ave. in Windsor, the Windsor Essex Community Housing Corp used over-cladding to solve structural problems, arresting spalling that was starting to occur in large areas of the brickwork. This building was particularly vulnerable in that it used “Through the Wall” (TTW) single layer brick construction, without an internal cavity.

Construction Year:	1972	Heating Fuel Source:	Electricity
Number of Units:	386	DHW Fuel Source:	Natural Gas
Gross Floor Area:	22,600 m <sup>2</sup>	Cooling:	No Central Cooling. 50% have Window AC
Number of Floors:	9	Tenancy:	Seniors

The over-cladding process includes the installation of a rain shield, while still allowing moisture to escape from inside the building. Overall, the goals of this exercise were to:

- Mitigate Spalling
- Investigate brick conditions
- Re-clad building
- Increase R-Value
- Control Moisture
- Add Air Barrier
- Improve Aesthetics



The standard EIFS detailing provides important assembly information designed to prevent water ingress while at the same time allowing moisture to escape from inside the building without exposure to freeze thaw conditions. With this project the Windsor Essex Community Housing Corp found it valuable to involve the EIFS regulatory agency (EIFS Council of Canada [www.eifscouncil.org](http://www.eifscouncil.org)), EIFS Quality Assurance Program Inc. (EQI) ([www.eifsgap.com](http://www.eifsgap.com)). It is important to include EQI in project plans because the installation quality of EIFS projects can greatly affect the long term viability.



EQI brings to the table many benefits:

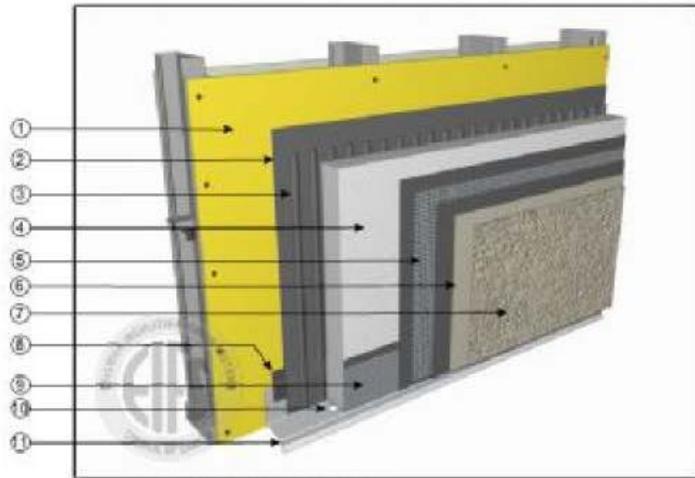
- EQI Contractors are subject to strict regulations and audits both random and mandatory
- Third party site inspection and testing
- 5 year installation warranty backed by 3rd party warranty provider
- 5 year material warranty backed by 3rd party warranty provider
- EIFS Cladding system, registered under EQI, provides a superior solution to historical housing industry issues

It is important to have a consultant experienced in EIFS modeling and design and knowledgeable in the EQI requirements. If using the Request For Proposal (RFP) process for procuring the consulting services these requirements should be included in the evaluation criteria. This was done by CHC and it proved very beneficial.

As a result, their experience with the system was well regulated and very positive. They also found it was critical to find a managing consultant with specific experience with EIFS and EQI, and also to use a general contractor who uses their own forces for the installation process. Following are the lessons learned as reported by the Windsor Essex Community Housing Corp (CHC). The over-cladding project was done in conjunction with a solar wall.

## **Lessons Learned**

- If scope of work is essentially EIFS work, then structure contract to engage EIFS contractor only and not GC. GC's have value, but not when 85+% of work is only EIFS
- Improve management of building interface with respect to penetration of EIFS (balcony dividers, fire connections, venting). A detailed design is required for each unique penetration.
- Pay close attention to tenant impact. Window AC's and balcony doors could not be used during construction, interior portable AC units were made available. Resident engagement is imperative prior to and during the project.
- Construction of EIFS is very weather dependent work – plan accordingly. Contingency planning is required (eg. Expanded hours of work during week days and weekends)



EIFS STANDARD WALL SECTION

- ① Substrate
- ② Water Resistive Barrier
- ③ Vertically Notched Adhesive or grooved insulation for drainage
- ④ Insulation Board
- ⑤ Reinforcing mesh embedded in Base Coat
- ⑥ Colour Primer if specified
- ⑦ Finish Coat (over finish coat primer if specified)
- ⑧ Transition material
- ⑨ Pre-wrap insulation at termination to allow for drainage
- ⑩ Optional Backer Rod and Sealant with drainage openings. Sealant applied to base coat as per sealant manufacturer instructions
- ⑪ Metal Flashing

### Conclusion

With careful specification, over-cladding is proving to be an effective means of arresting and preventing serious structural problems, while at the same time providing energy savings, and aesthetic improvements to the building envelope. Over-cladding also reduces or eliminates maintenance problems on the brickwork, shelf angles, and other areas of water ingress.