the weather storm

Wind and Water Can Damage a Building's Exterior; Use a Rainscreen Wall to Prevent Infiltration

The penetration of water through buildings is curse widely scattered throughout the construction industry. For many years, builders have tried to retain water outside of buildings. Each technological discovery carried upheavals at the exterior of buildings. A certain number of questions can be retained from the scientific researchers of construction.

How to define the problem? The problem is water infiltration. Water enters a building through areas in the floor, wall bases, above windows, roofs and pipes that pierce the exterior of the building. The penetration problems of water and their consequences are known as stress factors. To find the answer, we must attack the source of the problem.

Water penetrates a building on the side where wind and rain attack In water infiltration, wind direction is an important factor. When it blows on one side of the building, it creates a positive pressure that creates suction on the opposite side (see Illustration A, page 30).

This has a cooling effect on the side of the building that faces the wind. Consequently it is too warm on the other extremity. The exterior, which is pierced, allows the wind to upset the heating, ventilation and air-conditioning systems. The rain water will also firmly moisten the upper lining and comers of the building in less than an hour. These areas are the most affected by water and wind (see Illustration B, page 30).

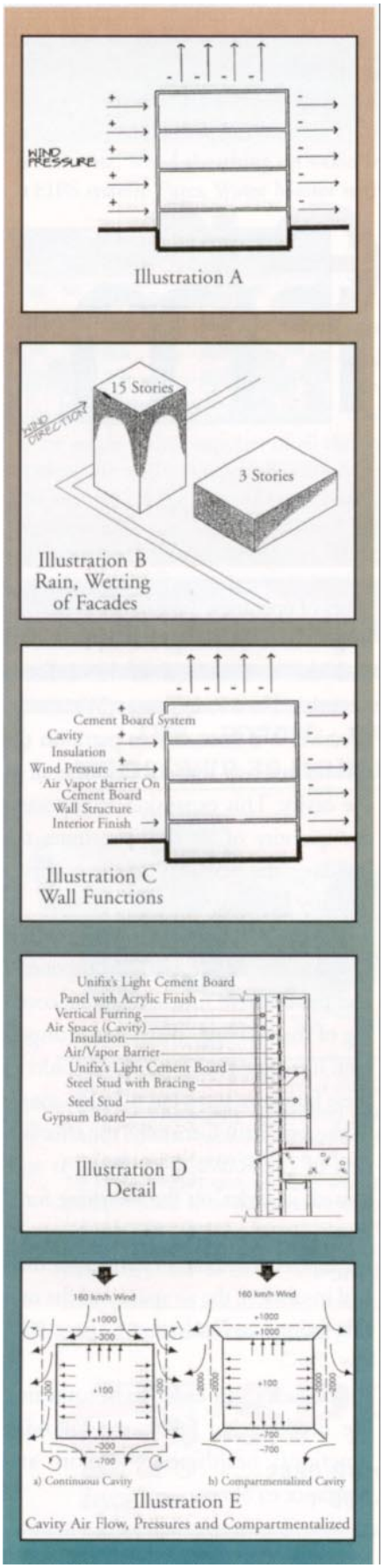
By a gravity effect, the rain water infiltrates the building through the same areas as air currents, penetrating the interior of the structure via either a direct or indirect passage through the exterior. This concept applies to most buildings.

Solutions? Use adequate caulking to create a water-tight seal on the circumferences of openings. Take into account the height of a building, its environment and the composition of its different materials. For a RAINSCREEN WALL to be effective, it is necessary to partition the cavities in a way that stabilizes the air in the cavity This expansion incorporates the quantity of air that penetrates the building, the flexibility of the materials and any movements of the exterior.

Evaluate the nature of the components and the different functions of the covering of the building. Each one is important. It is often noted that any disorder of these functions turns out to be the source of the problem. Generally, the effectiveness of the RAINSCREEN WALL is sup ported, in order, on the following functions: the interior facing the structure, the vapor barrier, the air barrier, the thermal insulation, the air space and the outside facing (see Illustration C, page 30).

Inside facing: In order to be attractive, the inside facing fulfills the following functions: healthiness, comfort and resistance to blows.

Structure: It supports the roof, wind



assaults, higher stories and walls. In certain cases, an independent structure made of steel, cement, cement blocks or wood becomes a part of this function.

Vapor barrier: The use of a vapor barrier slows down the transmission of interior humidity through the inner wall.

Thermal insulation: This function creates a resistance to heat, which tends to want to escape from the inner wall.

Air vapor: This function, the fruit of researchers in the 1970s, has been integrated into the construction industry for a decade. It offers a resistance to escaping or entering air. The air escaping by the inner wall takes with it the surrounding humidity; this damages the exterior wall materials. The contact with these materials, which are at colder temperatures, favors condensation and the accumulation of ice. This provokes a premature deterioration of the system.

Balancing the pressure: Balance is created by the air space situated behind the outside facing. Its function is to create a "chamber" that balances the pressure of the outside air. This phenomena stops water from penetrating the inner wall of the covering. For example, imagine a capped, empty bottle pushed down into a pail of water. Even though the bottle is completely submerged, water does not penetrate inside because of the air inside. However, even a small hole in the bottle will let the water in.

Exterior facing: It is a protective function against the elements of nature (sun, rain, wind, snow, etc.), humans, animals, etc. The exterior facing is essential because it protects the structure from all the elements that assault it daily. However, it is rarely completely waterproof from air or water.

To realize a Rainscreen Wall, certain requirements must be met. First, there must be a cavity behind the exterior facing, assuring that no air circulates in the inner wall or cavity, Why? Because this cavity serves as a balanced air chamber between the exterior and interior facings, and because it will prevent water from penetrating into the wall system. How does it work? Pushed by wind, the rain water falls on the exterior facing, follows the air, passes through cracks and infiltrates into the whole system.

Due to a difference in pressure, there must be an air current to circulate the air. If the air can circulate in a cavity, it will bring the rain water with it. The cavity behind the facing must be closed to create a chamber that permits the wind a balanced pressure to stop rain penetration (see Illustration D, at left).

To be effective, the back-up wall must be sealed to decrease air leakage from one side to the other side of the wall. The force of the wind is now applied directly on the back-up wall of the exterior f&z-ing. This wall must be able to support the wind changes relative to each region.

The exterior facing has a different function. It acts as a barrier, impeding the infiltration of rain water. This is made possible by the cavity, which creates an air pressure equal to the wind pressure. The exterior facing obstructs the passage of water. The empty bottle placed in water is a good example of balanced pressure. The facing in lightweight concrete boards and acrylic coatings constitutes an excellent example of a system, that creates a balanced pressure chamber (see Illustration E, page 30).

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The RAINSCREEN WALL has a positive effect on the durability of buildings exterior, on energy saving, as well as on public health and security.

Durability: The exterior will deteriorate less quickly if less water infiltrates, if it protected from freeze and thaw cycles, and it does not rot.

Health: The control of air will be more adequate on the inside because the implicit function of the air barrier is induced in the system. The elimination of rot in the walls due to water penetration will permit the conservation of a better quality of air. The acoustics of the exterior wall will be better thanks to a more air-tight covering.

Security: Since the risks of deterioration will be less, the durability of the structure will be less affected.

Saving: Throughout the life of the building, much energy will be saved because of the decrease in heat loss through air leakage. An indirect saving will be seen since the maintenance of the exterior facing will be minimized.

The RAINSCREEN WALL permits human error or the presence of a premature minor deterioration. In cases of water infiltration, the cavity allows a free circulation of air, which evacuates air and water at the base of the wall. This is essential since it concerns the life of the walls, especially in frost zones at risk. This means that the exterior will be functional without the deterioration of the facing affecting the entire system.

The RAINSCREEN WALL can be applied to many faces, including masonry, metallic siding, ceramic, etc. The UNIFIX system (lightweight concrete board and acrylic coating) is an exterior facing that serves as a RAINSCREEN WALL. It is used for renovations and construction.

About the Author
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