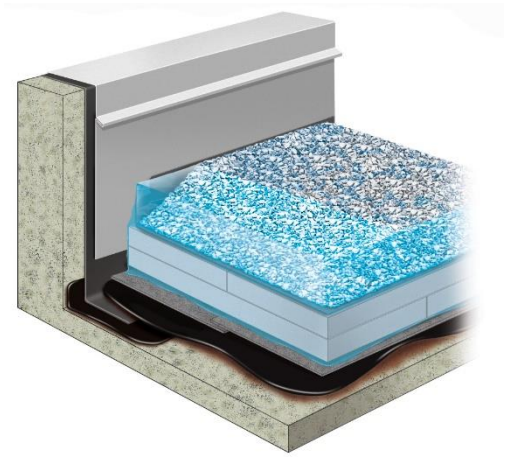
Climate Change and Stormwater Management

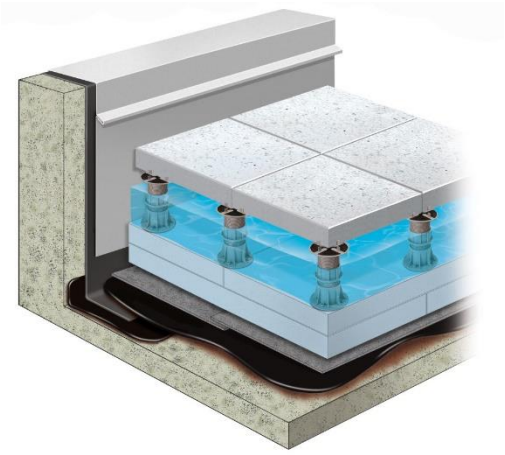
Denis Gingras, National Sales Director

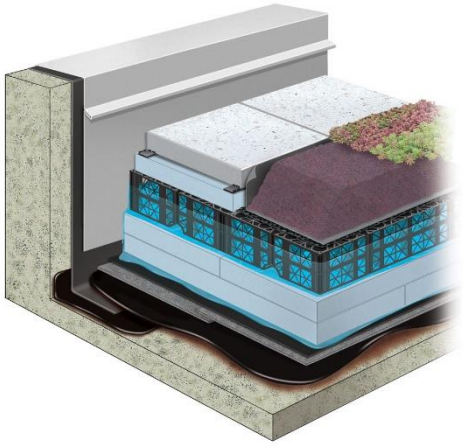
A new color is emerging in the roofing field; after green roofs and white roofs, now here is the blue roof. The dense nature of urban areas, combined with the increased intensity of rain events and lack of at-grade green spaces, heavily taxes our municipal stormwater infrastructure. With increased risks of urban and overflow flooding would be expected outcomes of over-taxed sewers. To counter these costly scenarios, addressing water where it falls – at the rooftop – is increasingly being considered. It is very expensive to increase the capacity of our old and outdated infrastructure. Underground space is also crowded with different utilities in the public right-of-way; the use of this space is limited. Flat roof surfaces provide a vast untapped resource to increase the ability to capture rainfall.

The blue roof is designed to hold rainwater for a period of time, usually between 24 and 48 hours depending on the municipality's requirements. This delay prevents vast amounts of water flowing into and overwhelming the storm sewers. Blue roofs have some particular requirements for keeping the building dry. To start out, a blue roof should include a waterproofing membrane; a seamless membrane designed to withstand a permanent hydrostatic head. Unlike roofing membranes, this type of membrane must be suitable for use in fully submerged conditions. In addition, this membrane must be able to be used in a zero-slope roof deck to optimize the blue roof water volume capacity. Hot-applied rubberized asphalt membrane meets this requirement very well. Its seamless installation and ability to be submerged for very long periods of time make it ideal for the wet conditions in blue roofs and green roofs as well. Water resistant thermal insulation comes next; XPS (e**X**truded **P**oly**S**tyrene type IV) insulation is the best as it does not pick up water. The qualities that make XPS an excellent thermal insulation also make it float. The overlying ballast material must be designed to overcome this flotation and keep the insulation on the deck.



For a protected membrane roof, the water is held in the voids between the aggregates, about 30-40% of the volume according to the size of the material used. Holding water may also occur in a plaza deck assembly beneath the pavers; the water is temporarily stored in the empty space created under the pavers that are installed on pedestals. Depending on the thickness of the XPS insulation used, the thickness of the paver may vary. The traditional 600 mm X 600 mm X 50 mm slab may need to be increased in thickness to address the buoyancy of the XPS insulation.





The third blue roof option is the combined green (vegetative)/ blue roof assembly where the water is jointly retained in the growing media and detained in the water storage units installed beneath the growing media and pavers. This option offers the maximum capture and management of water at the rooftop. This hides the stormwater function below the green space. The user never knows that a significant stormwater management feature is working below the green surface.

In a protected membrane roof assembly, the controlled flow drain weir must be provided at the level of the waterproofing membrane. Emergency scuppers or a standpipe must also be provided at the perimeter of the roof in accord with the good practice of local plumbing code. As for the structure, it must be calculated according to the load of a blue roof at full capacity. To maximize the water detention capacity, a roof with a slope of zero (0%) is ideal. On a flat roof, the water flows by gravity through the head pressure created by the height of the installed materials with the lowest point being the drain.

The use of blue roofs in stormwater management in urban areas is becoming more and more common and is an integral part of a global concept of sustainable development called the " Sponge City ".

Denis Gingras, National Sales Director / dgingras@hydrotechmembrane.ca
Hydrotech Membrane Corp.