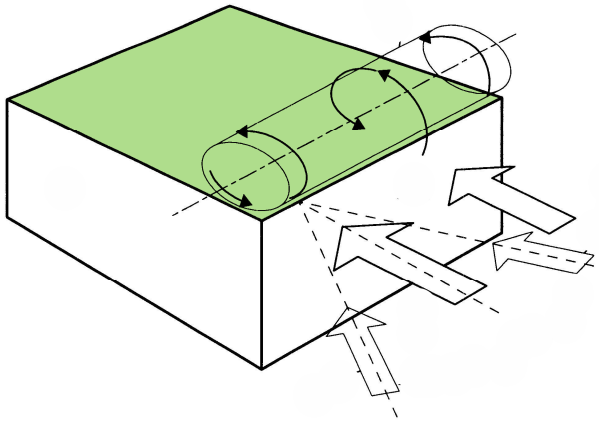
WIND UPLIFT CALCULATIONS VEGETATED ROOFS



Information Sheet

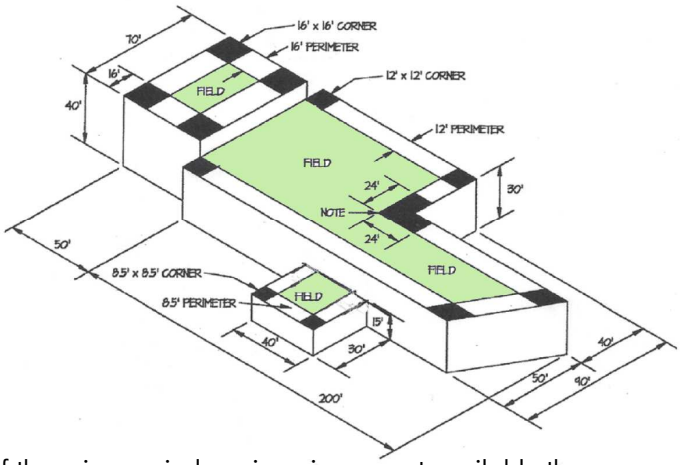
Rooftops are often windy locations. The green roofs built on them must be stable in these high wind environments. This becomes most critical with loose laid waterproofing where the green roof provides the ballast to protect the waterproofing.

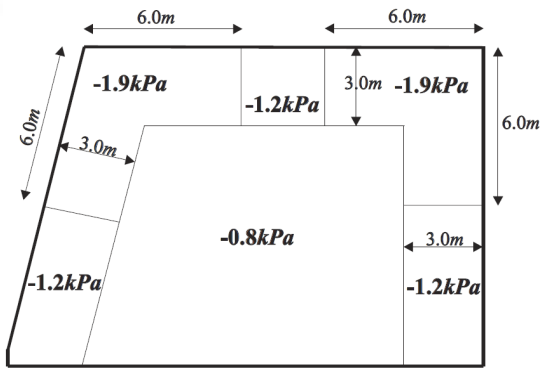
Wind uplift varies over the roof area – from low pressures in the centre to high at the roof perimeter and corners. Additional ballast may be required in these areas. (pavers or course gravel)

HOW TO DESIGN THE GREEN ROOF ASSEMBLY AGAINST WIND UPLIFT?

Step 1: Wind Load Study

Many building construction projects include wind engineering studies as part of the design requirements which look at wind loads on cladding and roof structures of the building. This report often includes unfactored wind uplift loads at the centre, perimeter edges and the corners of the roof areas based on the 50 yr. event. The wind uplift loads are often given in units of kilopascals (KPa) (Note: 1 KPA = 20.88 lbs per ft^2.)





Close-up of 5th Floor Green Roof

If there is no wind engineering report available than we can assist you doing the wind engineering report for your specific for your green roof project. Please contact us at: 1-905-690-1661.

Step 2: Safety Factor

Based on the local building codes a safety factor may apply. The *Toronto Green Roof Construction Standard* requires a **safety factor of 1.7** (or 200 mm of growing medium depth) if the green roof is used as a primary ballast against wind uplift for loose laid waterproofing membrane assemblies. If the green roof growing medium is used as a secondary ballast material to ballast the loose-laid roofing components above the waterproofing membrane (i.e., drainage panel, retention mat, root barrier, and insulation board), but not the membrane itself, use a minimum **safety factor of 0.85** (or as designed by the designer).

Where vegetated, pre-cultivated mats are used, anchor them until the mat's root growth has achieved sufficient attachment into the growth media to adequately resist wind action (at least one full growing season). Vegetated mats should be properly anchored or ballasted against wind forces based on a **safety factor of 1.0** (or as indicated by the designer). *Source: Toronto Green Roof construction standard.*

ZinCo Canada Inc.
P.O. Box 29 · Carlisle · L0R 1H0 · Ontario
Phone 1-905-690-1661 · Fax 1-905-689-0432
greenroof@zinco.ca · www.zinco.ca

Life on Roofs

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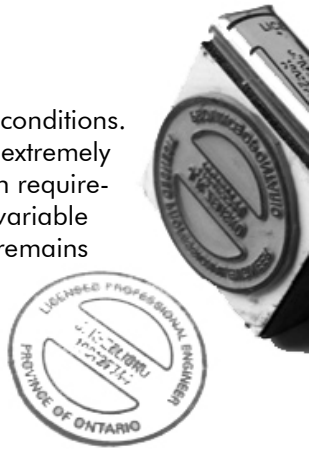


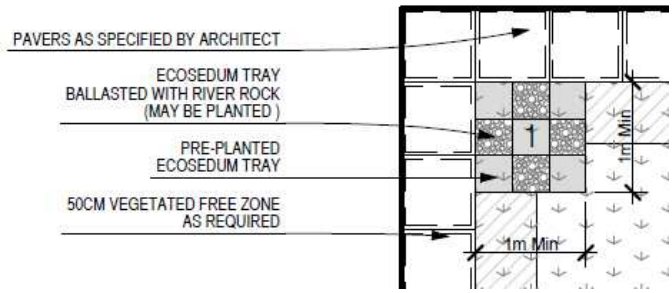
Step 3: Green Roof Assembly Design

The green roof assembly must be designed to meet the 50 year event under worst case (dry) conditions. The growing medium provides the majority of this weight. The ZinCo green roof systems are extremely flexible in design and installation and can be tailored specifically to the wind uplift calculation requirements of you green roof project. Various drainage elements, growing medium densities (in variable depths) and vegetation options (anchoring) are available to design a green roof system that remains stable under high wind uplift conditions and which wind engineers are comfortable with t o sign off on.

Step 4: High Wind Locations

To meet compliance requirements, green roofs are often installed on high buildings in high wind uplift conditions. On these projects, if the roof perimeter and corner areas are part of the green roof, the growing medium must be protected against wind erosion. Immediate 100% vegetation cover in these areas is required.

The ZinCo EcoSedum is the ideal solution. These pre-grown grids are open at the bottom allowing the plant roots to grow into the growing medium below adding further resistance to wind uplift. The individual grids are locked into adjacent units to form a monolithic unit. The grids can be used in combination with pavers for high uplift areas.

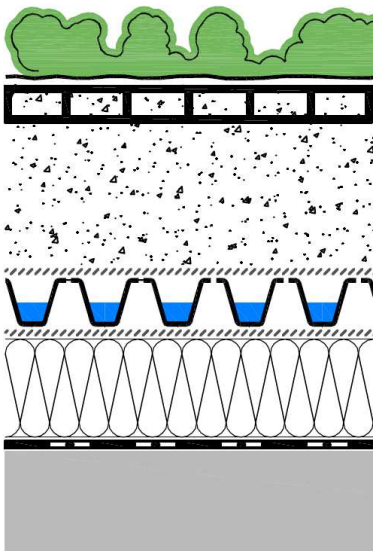


ZinCo Ecosedum Grid

Pre-grown vegetation mat

Extensive Green Roof in High Wind Location. ▲

ZinCo green roof assembly for high wind locations ►



ZinCo Ecosedum Grid

Growing Medium ZinCoBlend-E
(Depth based on wind calculations)

ZinCo Filter Sheet SF
ZinCo Floradrain Element
Diffusion membrane ZinCo TGV21

Rigid Insulation

Root Barrier ZinCo WSF 40
Waterproofing Membrane

Roof Structure

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