

RCABC's Guarantee for Vegetated Roofs:

Managing Risk in a Changing World

BCBEC (Vancouver) Luncheon Seminar

September 24, 2025

RCABC ROOFING CONTRACTORS ASSOCIATION OF BRITISH COLUMBIA | RoofStar GUARANTEED. BETTER.

About Me

James Klassen (B.A., B.RS., Cert. Conflict Resolution)

RoofStar Technical Advisor (October 2014)



- ☆Background:
  - ☆ Insurance claims professional (14 years) (Self-employed - RUBIX)
  - ☆ Estimator / Health & Safety professional (RCABC Member)
  - ☆ Manager – Facilities, Grounds, Transportation (Private school)
- ☆RGC Claims examiner, technical writer, RPM manager, and in-house Code specialist
- ☆Lead developer of RCABC's green roof Guarantee
- ☆Member of the CSA A123 Technical Committee
- ☆Avid sailor

Presentation

- **About the RCABC** (brief, I promise ☺)
- **Green Roofs** (A brief primer)
- **True and False** (The myths, and what green roofs actually do)
- **Risk-managed Green Roofs** (The RoofStar Vegetated Roof Guarantee Program)
- **Q&A**



Photo credit: Berger Partnership, Seattle, WA

The RCABC

Experienced and Committed to Excellence

RoofStar Guarantee

About the RCABC

The RCABC

- A Member-driven organization:
  - 52 Member Contractors around BC
  - 58 Member manufacturers, Suppliers, and Affiliates
- Represented the roofing industry for 65+ years
- Writing Guarantees for more than 50 years
- Developing Guarantee Standards for more than 30 years



RoofStar Guarantee

About the RCABC

We cover what covers you

- Internationally recognized third-party Quality Control/Quality Assurance Guarantee Program
- Underwriting millions of dollars of roof projects (by contract value)
- Low claims record

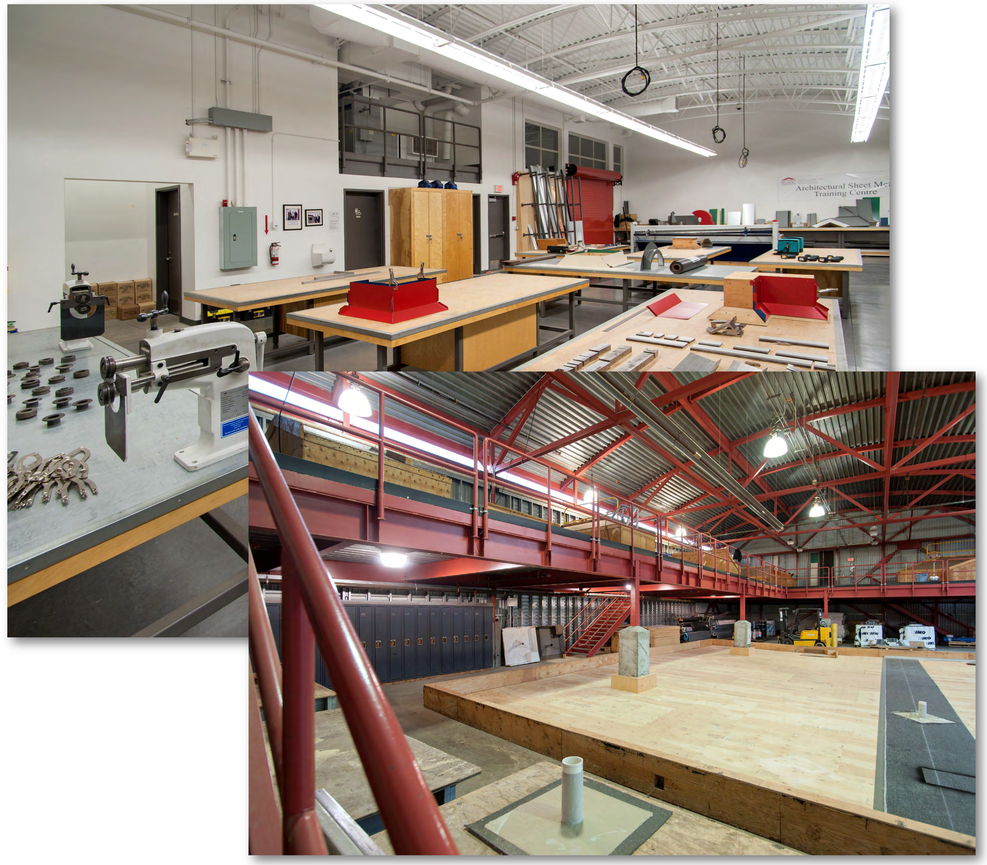


RoofStar Guarantee

About the RCABC

We’re also busy training, researching, and influencing

- Training roofers through BC’s recognized apprenticeship program for roofing
- National Research Council projects
- CSA Group technical standards



RoofStar Guarantee

About the RCABC

Read more about us on our website:

www.rcabc.org



Green Roofs

A brief primer

Green Roofs
A Brief Primer

Green roofs – an old idea

- Ancient Babylon (the famed Hanging Gardens, evidenced in archaeology)
- Sod-roofed homes
  - Norse (Viking) settlements
  - North America's grassland prairies
- Late 19th Century, Germany – sod and gravel roofs were introduced to prevent chimney embers from igniting tar roofs on low-cost rental housing for labourers

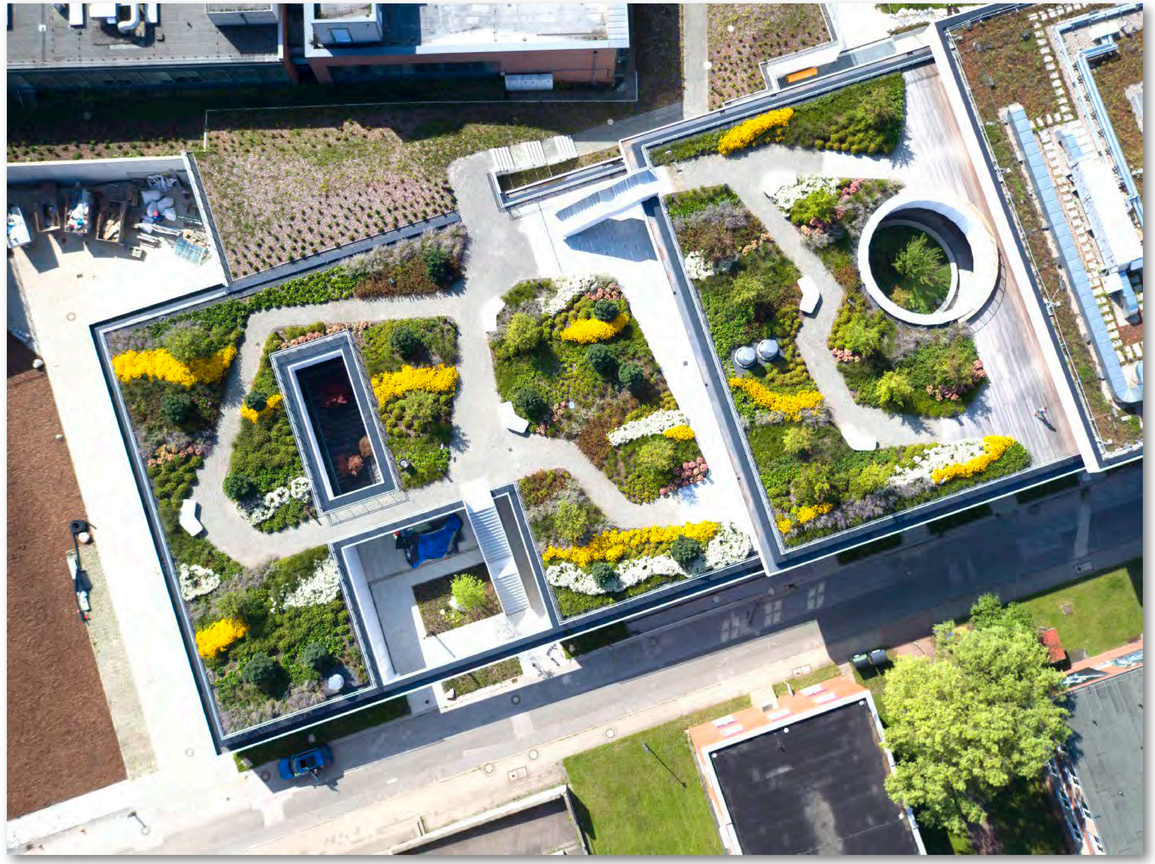


Sod roofed house (semlin), Mennonite Heritage Village Museum, Steinbach, MB
(Photo: Tridadvisor.com)

Green Roofs
A Brief Primer

Modern green roofs – a European innovation

- Designed for modern waterproofing roofs
- Standardized in the “FLL” standard which is globally recognized
- Built to extend the life of roofing and make cities more habitable, because of the rapid decline of green space.



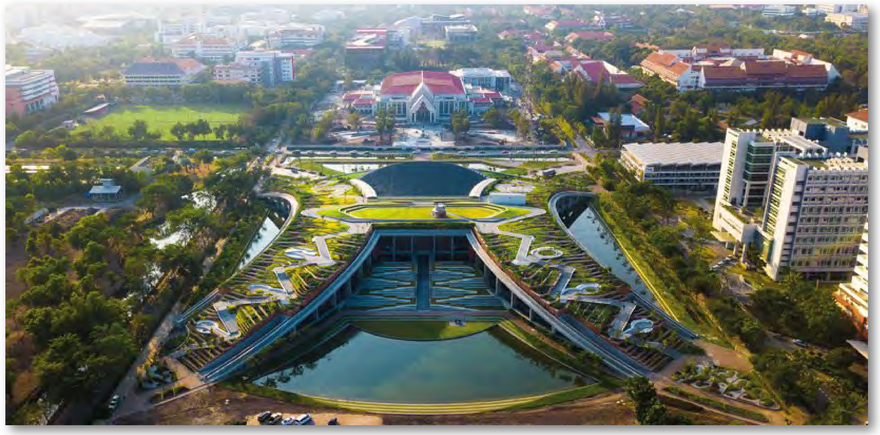
The Max Planck Institute for the Structure and Dynamics of Matter, Hamburg, Germany (Photo: Green Cities Europe)

Green Roofs

A Brief Primer

RCABC ROOFING CONTRACTORS ASSOCIATION OF BRITISH COLUMBIA | RoofStar GUARANTEED. BETTER.

Today, green roofs can be found around the world



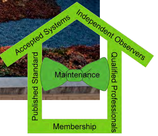












Green Roofs
A Brief Primer

Modern green roofs are an extension of the covering on a building

- A “vegetated” or “living” roof is a system of integrated components placed on a waterproof roof and is designed and built to protect the roof and support the growth and vigor of plants.



(Photo: Steve Chrostowski)

Green Roofs
A Brief Primer

- Green roofs serve many functions, but primarily, they are built to
  - Slow down the discharge of stormwater from a roof,
  - Protect the waterproofing membrane from damage, the sun, and aging,
  - Buffer a building from heat and cold, and
  - Add beauty.

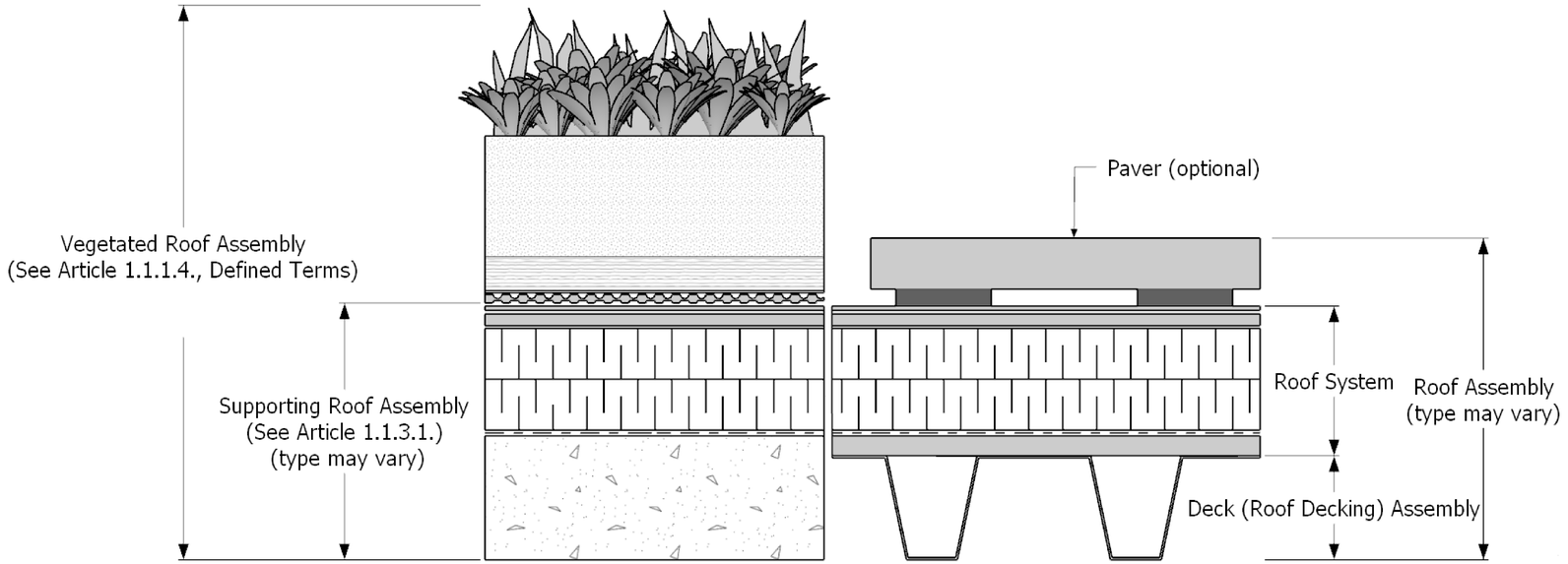


California Academy of Sciences, San Francisco (Photo: Christine Thuring)

Green Roofs
A Brief Primer

A green roof assembly

- When a green roof system is placed on a roof, we call it a green roof assembly. So, what is a roof?



Note: The illustration is representative and does not convey every possible assembly or roof slope.

NTS

Green Roofs
A Brief Primer

A roof that supports a green roof is….

- A system of interacting components designed and built for the primary purpose of protecting the building from the weather (water, wind, heat, cold).
- A shield against fire caused by falling embers.
- Walls are important, but the roof takes the brunt of the weather and ties together the ‘building envelope’, like the flap on a paper envelope.



Green Roofs
A Brief Primer

Roof function

- All roofs fall into one of two categories
  - They are waterproofed (fully sealed) against water intrusion
    - ✓ Sheet membranes
    - ✓ Liquid membranes
  - They shed water (using gravity) but are not fully sealed against water intrusion
    - ✓ Asphalt shingle and cedar shingle/shake roofs
    - ✓ Metal roofs
    - ✓ Tile, slate, and other materials that are ‘shingled’



Example of a waterproofed roof (Photo: RCABC Image Library)

Green Roofs
A Brief Primer

Roof function can limit roof slope.

- Waterproofing roof systems can be installed on any slope, even vertically (we do this all the time on parapets and full-height walls)
- Water-shedding roofs, on the other hand, are limited to slopes that provide enough gravitational pull to freely move water off the roof.



An example of a water-shedding roof that didn't contemplate the consequenced of interrupting the flow of water to the roof edge. Consequently, it leaked (Photo: RCABC Image Library)

Green Roofs
A Brief Primer

Waterproofing roofs, suitable to support a green roof, come in four configurations:

- Conventional (insulated below the membrane)
- Uninsulated (usually insulated below the deck)
- Protected (insulated above the membrane)
- Modified Protected (an uncommonly used hybrid of conventional and protected)

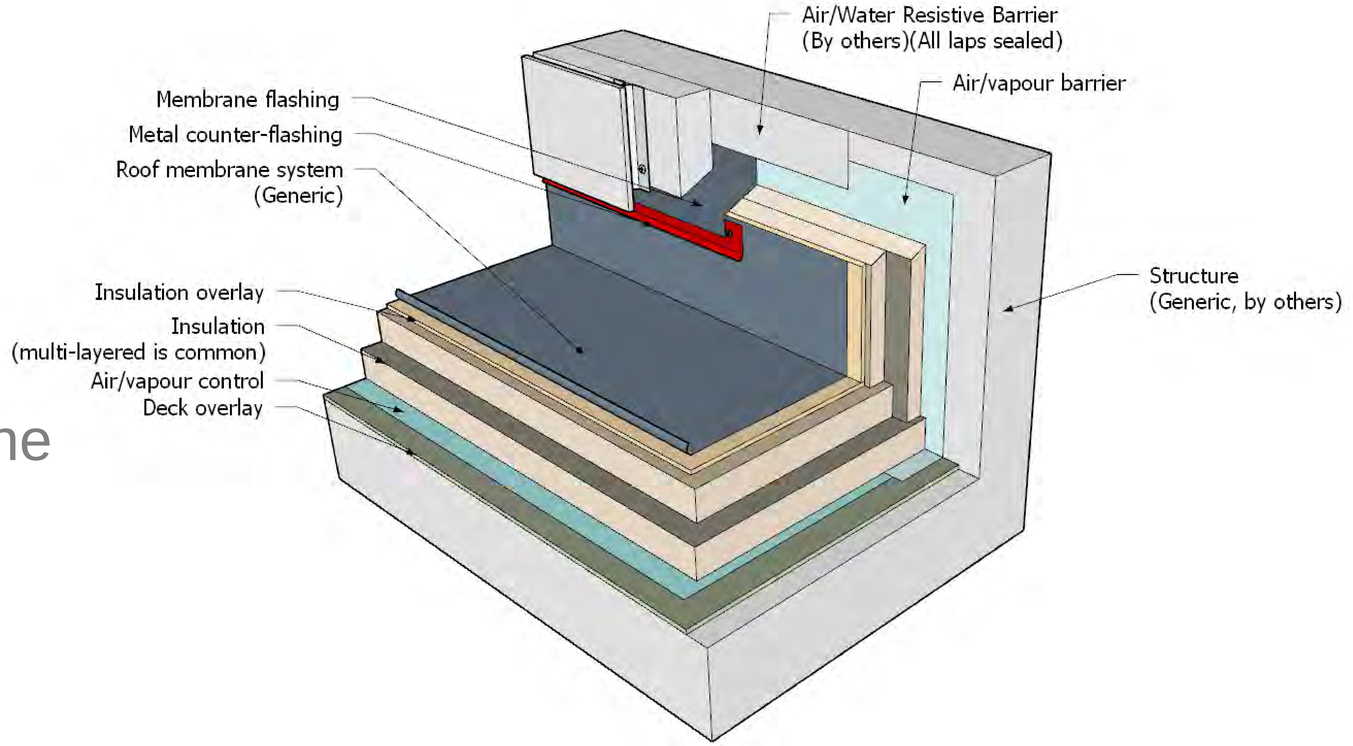
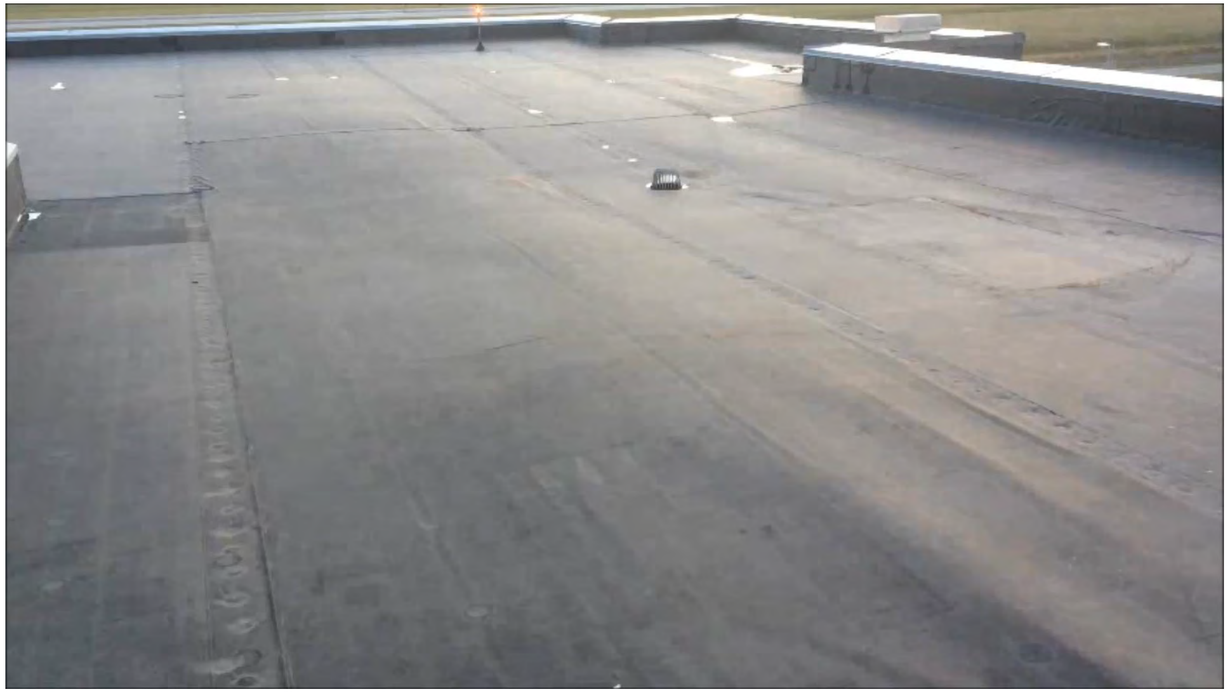


Illustration of a typical 'Conventional' roof assembly (insulated below the membrane) (Image: RGC Standards)

Green Roofs
A Brief Primer

All roofs, including waterproofing roofs, are affected by wind.

- Structural loads are usually thought of as gravitational (pulling the building down)
- Wind is often viewed as pushing or pulling
- Suction loads can be very strong, lifting poorly secured roofs off a building
- National and British Columbia Building Codes require that a membrane roof be designed and built to resist those loads
- RCABC's roof Standards support and often exceed Code minimum requirements



This video illustrates how wind, passing over the horizontal surface of a conventionally insulated membrane roof, creates suction loads that can lift off a poorly secured roof system. The wind in this video was blowing only 17 km/h!
(Video: RCABC Image Library)

Green Roofs
A Brief Primer

When a roof isn't designed or built to resist wind loads, this is what happens….

- When the supporting roof fails, the green roof fails also.

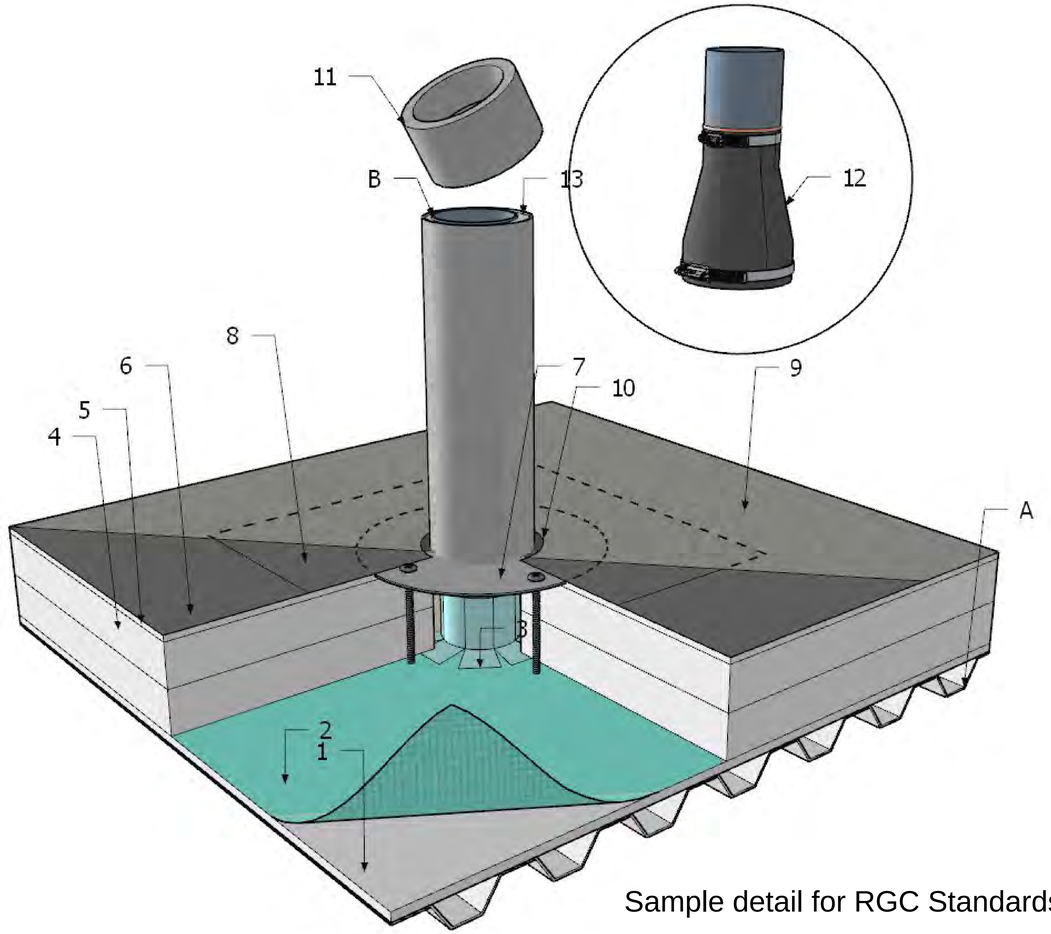


A commercial roof in Prince George that wind ripped apart because the contractor (not an RCABC Member) didn't properly secure it to resist wind suction loads. Needless to say, the water damage inside the building was catastrophic (Photo: RCABC Image Library)

Green Roofs
A Brief Primer

Details, details!

- Drains
- Pipe penetrations (plumbing vents, B-vents, etc.) & structural penetrations (i.e., HSS posts)
- Curbs
- Electrical and gas penetrations
- Membrane terminations at an edge, at curbs, and on walls



Sample detail for RGC Standards

Green Roofs
A Brief Primer

A well-designed and expertly built waterproofing roof possesses all the characteristics of a suitable platform for green roofs:

- Designed for serviceability
- Built for access to critical details
- Promotes longevity and durability
- Secured to resist wind loads
- Follows QC/QA requirements, to reduce risk for owners and insurers



Green roof on the Loblaws store, North Vancouver. Note the walk-out rooftop access, which is essential for green roof maintenance
(Photo: RCABC Image Library)

Green Roofs
A Brief Primer

The definition of a successful green roof:

- Thriving, vigorous vegetation
- Well-drained
- Self-propagating
- Maintained
- Insurable (actually, a good insurance risk)



Photo credit: Berger Partnership, Seattle, WA

Green Roofs
A Brief Primer

Like the roof that supports it, green roofs can be configured in several ways:

- Extensive systems
- Semi-intensive systems
- Intensive systems



RCABC Demonstration/Practice Roof – Exensive system (Photo: RCABC Image Library)

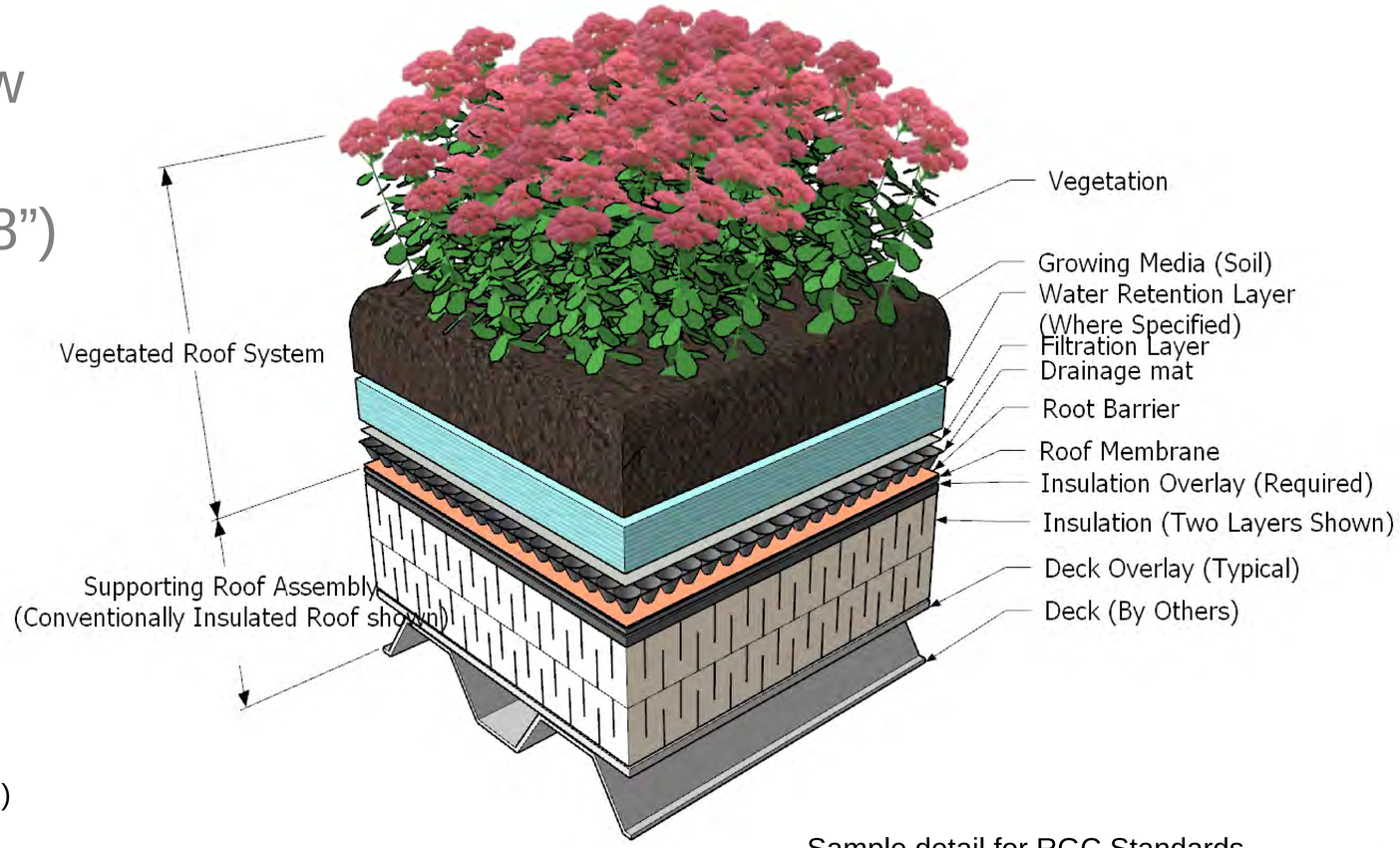
Green Roofs
A Brief Primer

Extensive systems

- Weight; height: lightweight; shallow
- Accessibility: usually inaccessible
- Media depth: 64 - 202 mm (2-1/2-8”)
- Vegetation: low diversity
- Maintenance: minimal costs



Image (above): Liz Hart-Morris, Greenup LLC (Used with permission)



Sample detail for RGC Standards

Green Roofs
A Brief Primer

Intensive systems

- Weight; height: heavy; variable to high
- Accessibility: usually accessible
- Media depth: >355 mm (14”)
- Vegetation: diverse (may include trees)
- Maintenance requirements: high

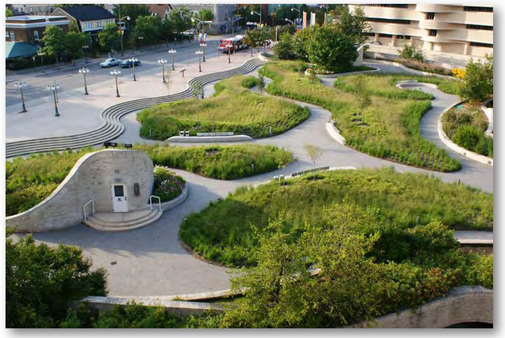
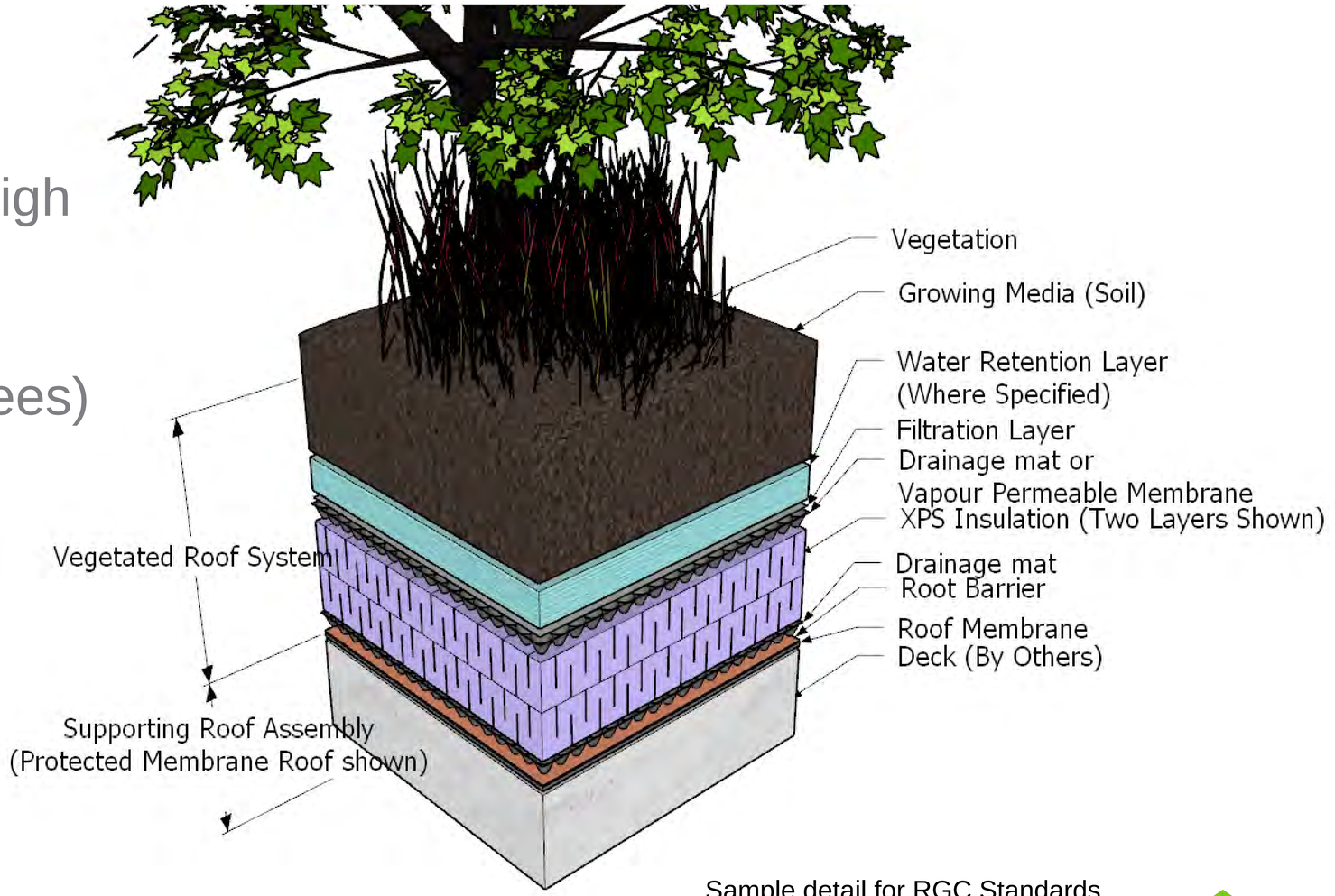


Image (above): Liz Hart-Morris, Greenup LLC (Used with permission)



Sample detail for RGC Standards

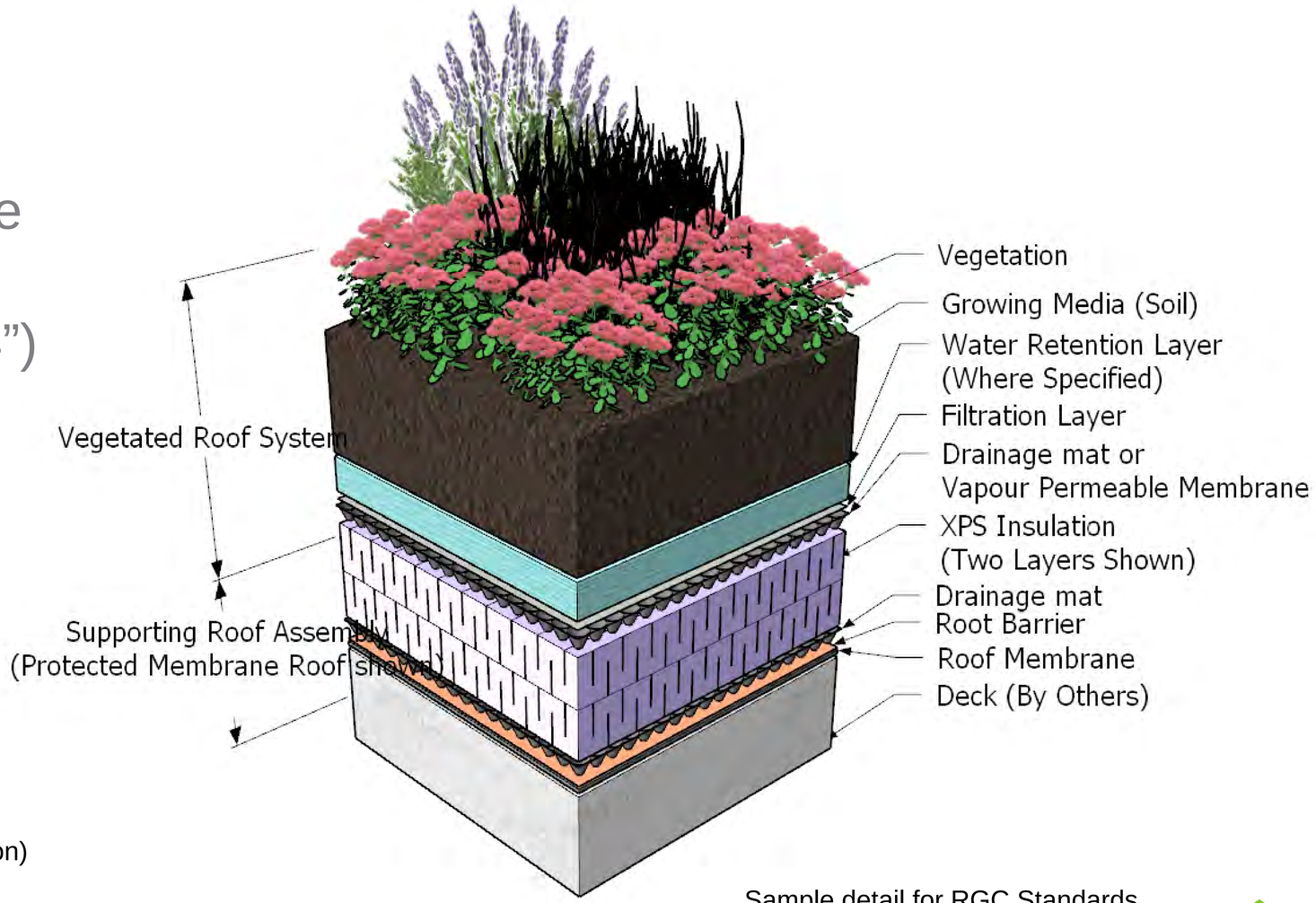
Green Roofs
A Brief Primer

Semi-Intensive systems

- Weight; height: moderate; variable
- Accessibility: may be accessible
- Media depth: 152 - 355 mm (6-14”)
- Vegetation: moderately diverse
- Maintenance: moderate costs



Image (above): Liz Hart-Morris, Greenup LLC (Used with permission)



Sample detail for RGC Standards

Green Roofs
A Brief Primer

Permissible Combinations
❖Intensive and Semi-Intensive

- ☆ The RGC Standard for Vegetated Roofs permits these types of green roofs only on a protected (“inverted”) roof assembly.
- ☆ This restriction recognizes that because of factors such as
  - ✓ mature system weight,
  - ✓ cultivable options (rooftop gardens and farms), and
  - ✓ more intensive maintenance requirements,



Image: Soprema’s Sopranature Installer Training Guide (Soprema Inc.)

Green Roofs
A Brief Primer

Permissible Combinations
- **Extensive Vegetated Systems**
  - may be used on any roof assembly type.
  - Typically, extensive green roofs are low-weight, non-aggressive systems that require the least maintenance of any vegetated roof type.



Image: Golden Ears Pump Station (Architek Sustainable Building Products Inc.)

Green Roofs
A Brief Primer

What about customized green roofs?

- **Deep systems, and even rooftop farms, are permitted in the Standard**
  - ☆ Only on inverted roofs
  - ☆ No vegetation coverage under the Guarantee (naturally!)
  - ☆ Additional membrane protection measures recommended (required in the RGC Standard



Image: Brooklyn Grange rooftop farm, NYC (Brooklyn Grange)



Image: Brooklyn Grange Naval Yard Building (www.brooklynavyyard.org)

Green Roofs
A Brief Primer

Putting a Green Roof Together

1. Root Barrier

- ☆ Root barriers are critical no matter the type of green roof system – even below sedums!



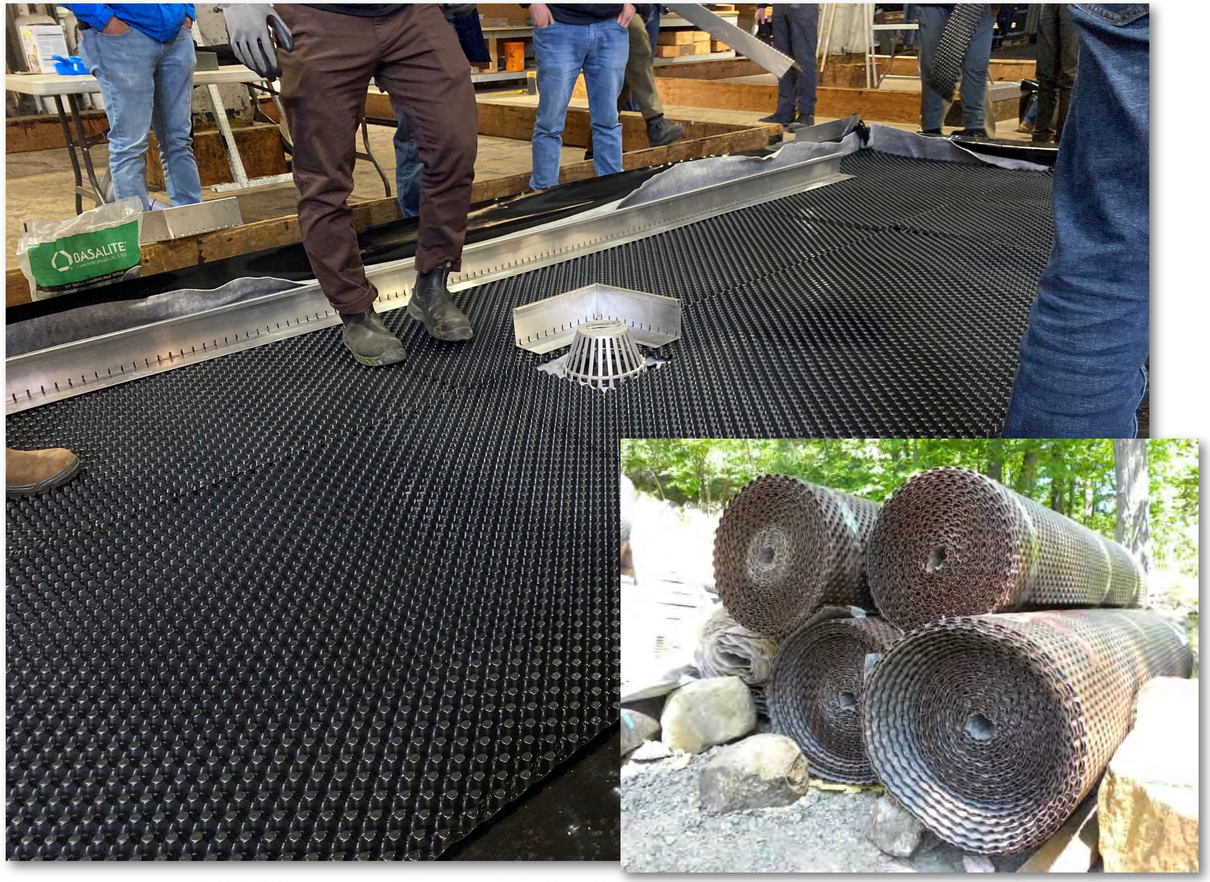
Image: RCABC Image Library

Green Roofs
A Brief Primer

Putting a Green Roof Together

2. Drainage Layers

- Every green roof needs help draining rainwater. Drainage materials do this, and each drainage layer is designed for its specific system and hydrological requirements.
- In “inverted” systems, a second drainage layer above the XPS insulation may be required to avoid a “vapour-closed condition” (this is addressed in the RGC Standards for waterproofing roofs)



Large Image: RCABC Image Library (ZinCo Canada drainage board used in GRIMP training)
Inset Image: Sopranature Installer Training Guide (Soprema Inc.)

Green Roofs
A Brief Primer

Putting a Green Roof Together

3. Filtration Layer

- ☆ Even growing media has fine particulate that can clog up the drainage layer or, worse, roof drains.
- ☆ A filtration fabric above the drainage layer(s) prevents this and promotes the free flow of water out of the vegetated system and off the building.



All Images: Sopranature Installer Training Guide (Soprema Inc.)

Green Roofs
A Brief Primer

Putting a Green Roof Together

4. Water Retention Mats

- These mats add water storage capacity and usually are placed above the filtration layer, immediately below the growing media.



Image: www.zinco.ca

2.4.2.5. Rainwater Management

1) This Article shall apply to all *buildings*, except

a) *float homes*,

b) *marinas*,

c) retaining structures,

d) those to which Part 9 applies, as described in Sentence 1.3.3.3.(1) of Division A of Book I (General) of this By-law, and

e) those *buildings* used exclusively for *residential occupancy* containing no more than 8 principal *dwelling units*.

2) Except as provided by Sentences (6) and (7), the first 24 mm of *rainwater* in a 24 hour period from the site area shall be detained, and the detention volume requirement

a) shall be calculated as the volume of water that would be present if water 24 mm deep covered the entire site, and

b) may be reduced by any combination of the retention or other practices listed in Table 2.4.2.5., by the amounts in Column C of Table 2.4.2.5.

2) Except as provided by Sentences (6) and (7), the first 24 mm of *rainwater* in a 24 hour period from the site area shall be detained, and the detention volume requirement

a) shall be calculated as the volume of water that would be present if water 24 mm deep covered the entire site, and

b) may be reduced by any combination of the retention or other practices listed in Table 2.4.2.5., by the amounts in Column C of Table 2.4.2.5.

City of Vancouver Building By-Law, Book II (Plumbing)

Green Roofs
A Brief Primer

Putting a Green Roof Together

5. Growing Media

- ☆ Engineered “soil” that promotes drainage, holds air and water, is a balanced blend of organic and mineral materials, and is lightweight.
- ☆ Our Standard permits only an engineered media. No naturally occurring (native) topsoil is allowed.



Image: “Understanding the Behaviour of Fire and Green Roofs” (Living Architecture Monitor, Summer 2021)

Green Roofs
A Brief Primer

Putting a Green Roof Together

6. Vegetation

- ☆ Herbaceous (non-woody) plants typify the profile for extensive green roofs, and they are available in many pre-grown forms:
  - ✓ Trays
  - ✓ Mats
  - ✓ Plugs,
  - ✓ Cuttings, and
  - ✓ Pots

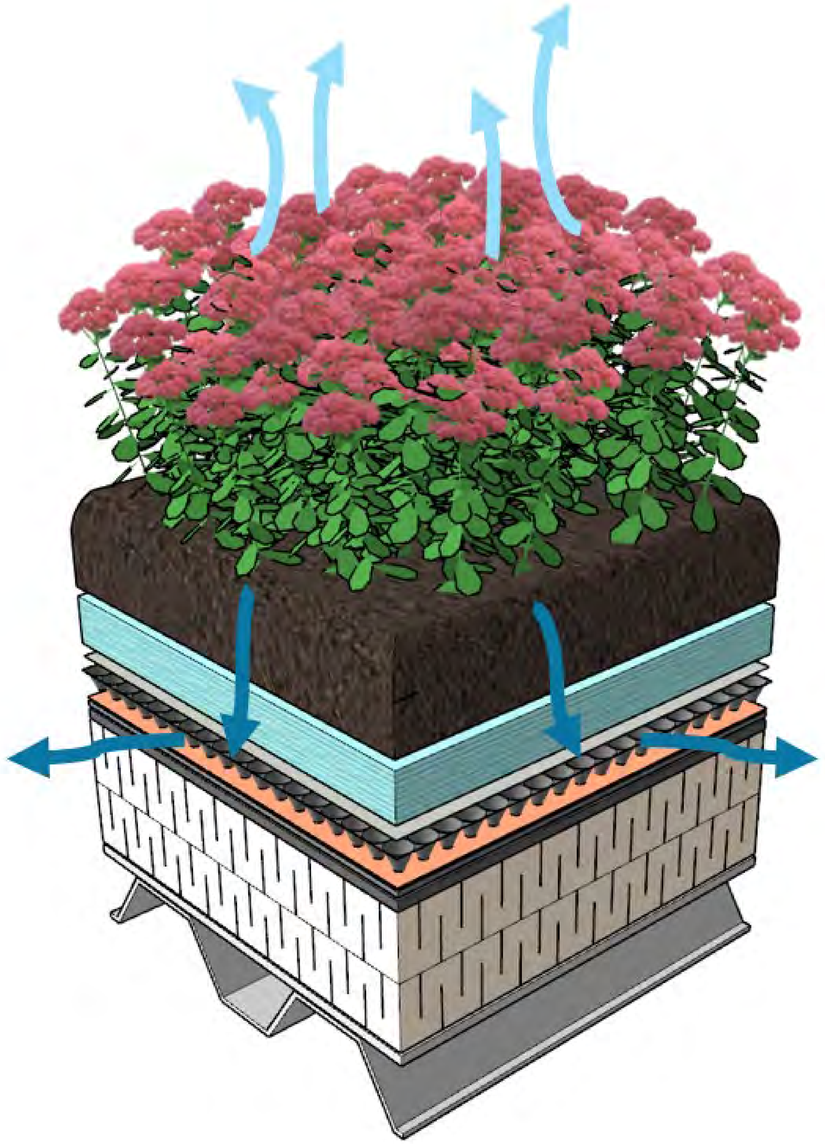


Image: WWF Roof, Washington DC

Green Roofs
A Brief Primer

How do green roofs manage water?

- Plants store water and then release it as vapour into the atmosphere. Sedums are adapted for water storage.
- Growing media (soil) holds and drains water vertically to the drainage layer (this is primarily handled by the mineral components in the media)
- The drainage layer (manufactured panels that both hold and release water) convey water laterally toward roof drains

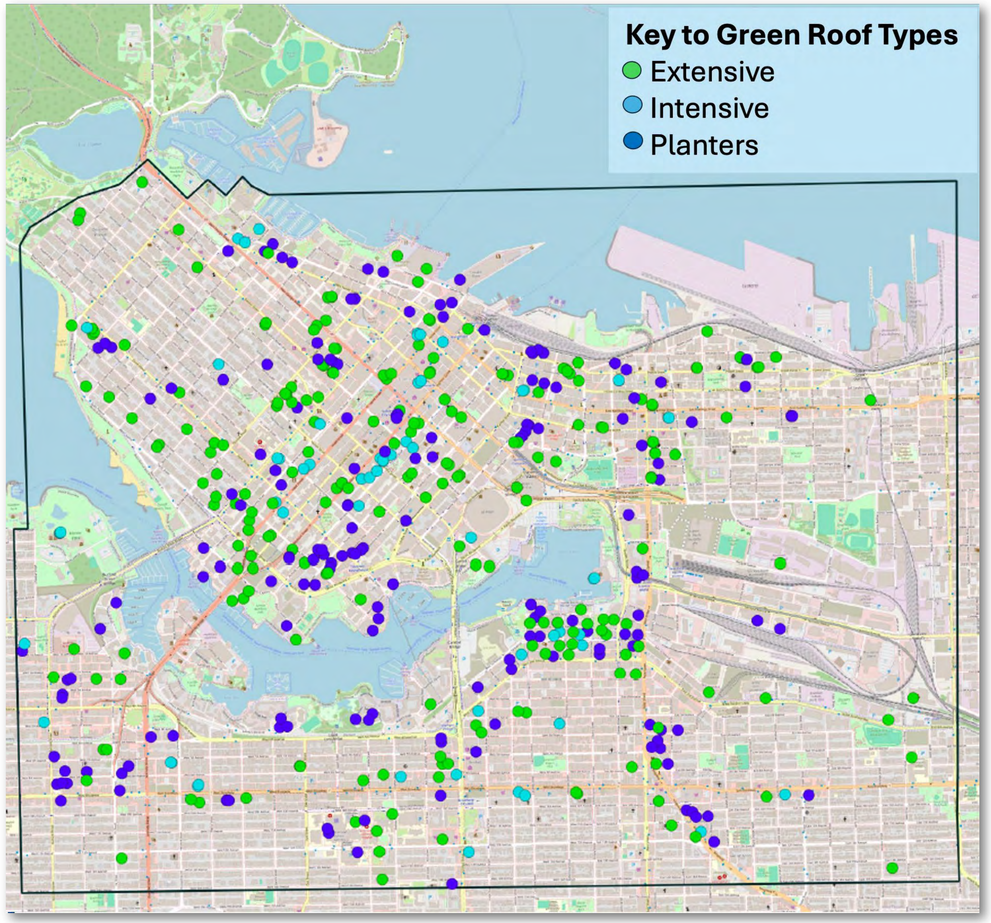


Green Roofs
A brief primer

How many roofs are already covered with green roof systems?

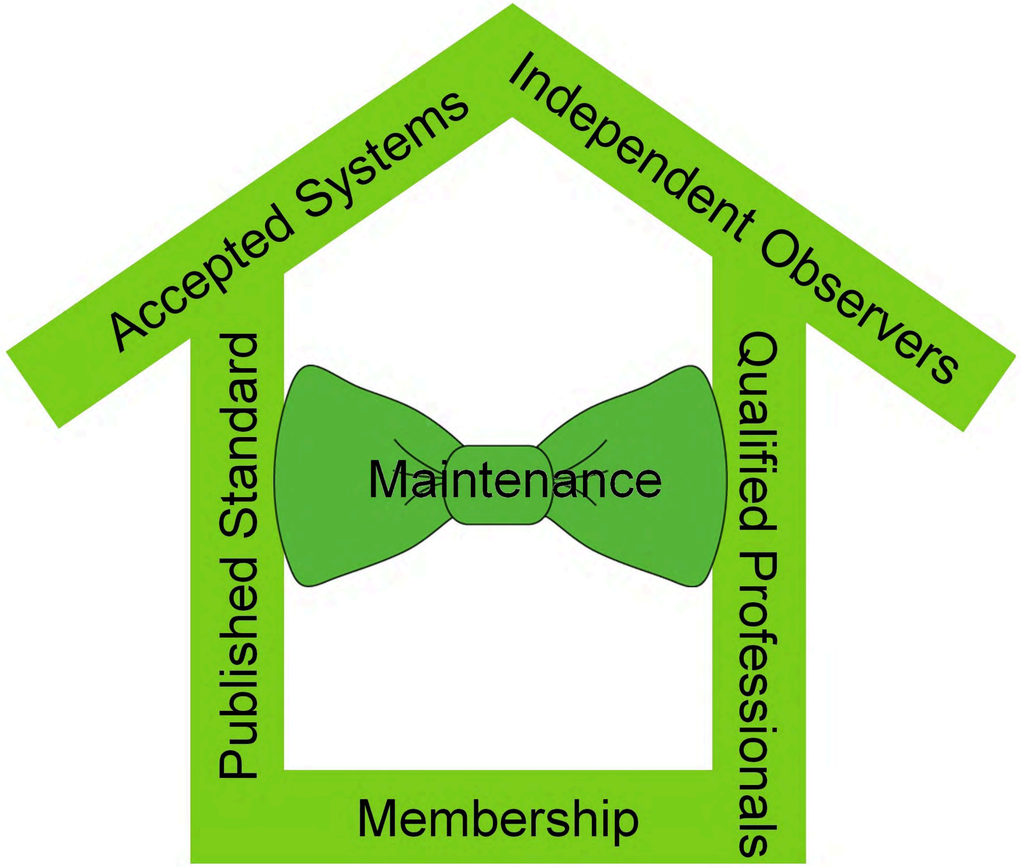
- The Green Roof Information Network (GRIN) leveraged new technology through Gentian Ltd. to map existing green roofs. You can read about this project in the Winter 2024 issue of the Living Architecture Monitor.

https://livingarchitecturemonitor.com/articles/mapping-vancouvers-green-infrastructure-and-roofscape-wi24



Green Roofs
A Brief Primer

Now that you know some of the basics of green roof design and construction, let's talk about the myths and misconceptions around green roofs.



True and False

What Green Roofs Actually Do

True and False

What Green Roofs Actually Do

Myths and fears about green roofs abound:

- Green roofs leak
- Green roofs cost too much and offer few if any benefits
- Green roofs can damage the roof membrane
- Green roofs are a fire hazard

But are those statements true about green roofs?



The former MEC headquarters roof, Toronto (Photo: Padraic on Flickr)

True and False

What Green Roofs Actually Do

Myth

- Green roofs ‘go bad’ and fail…



Membrane damage from aggressive bamboo roots (Photo: RCABC Image Library)

True and False

What Green Roofs Actually Do

Reality

- When green roofs are
  - ☆ designed and built to an objective, enforceable set of Quality Control requirements, and
  - ☆ independently reviewed (Quality Assurance),
    - ✓ they remain watertight,
    - ✓ they thrive and grow, and
    - ✓ they will manage stormwater better than an exposed membrane roof.



Private residence, Sooke, BC (Photo: Architek Sustainable Building Products Inc.)

True and False

The myths, and what green roofs do

Why green roofs ‘go bad’:

- Not designed or constructed to an enforceable standard



Professional installation of a green roof
(Photo: Sempergreen USA)

True and False

The myths, and what green roofs do

Why green roofs ‘go bad’:

- Not designed or constructed to an enforceable standard
- Designed for a generic climate, not for the building’s location



The roof at Van Dusen Gardens, designed for the building location climate
(Photo: Architek Sustainable Building Products Inc.

True and False

The myths, and what green roofs do

Why green roofs ‘go bad’:

- Not designed or constructed to an enforceable standard
- Designed for a generic climate, not for the building’s location
- Built by unqualified people who know landscaping but not green roofing (and who don’t understand what a roof is)



Irrigation support puncturing roof membrane because the irrigation contractor was unaware that lines cannot be staked like irrigation lines at grade (Photo: RCABC Image Library)

True and False

The myths, and what green roofs do

Why green roofs ‘go bad’:

- Not designed or constructed to an enforceable standard
- Designed for a generic climate, not for the building’s location
- Built by unqualified people who know landscaping but not green roofing (and who don’t understand what a roof is)
- Built with poor attention to sequencing (lack of coordination accounts for numerous failures)



Good sequencing makes this roof on the Golden Ears Pump Station a success (Photo: Architek Sustainable Building Products Inc.)

True and False

The myths, and what green roofs do

Why green roofs ‘go bad’:

- Not designed or constructed to an enforceable standard
- Designed for a generic climate, not for the building’s location
- Built by unqualified people who know landscaping but not green roofing (and who don’t understand what a roof is)
- Built with poor attention to sequencing (lack of coordination accounts for numerous failures)
- Value-engineered for inevitable failure (for example, swapping out the engineered growing media for ‘topsoil’, or (as illustrated at right) deleting the root barrier)



The root barrier in this green roof (the system has been removed) was deleted from the system, resulting in serious root damage to the roof (Photo: RCABC Image Library)

True and False

The myths, and what green roofs do

Why green roofs ‘go bad’:

- Not designed or constructed to an enforceable standard
- Designed for a generic climate, not for the building’s location
- Built by unqualified people who know landscaping but not green roofing (and who don’t understand what a roof is)
- Built with poor attention to sequencing (lack of coordination accounts for numerous failures)
- Value-engineered for inevitable failure (for example, swapping out the engineered growing media for ‘topsoil’, or switching tested system drain boards for ‘cheaper’ options)
- Unmaintained (a significant reason for vegetation die-off)



Green roof maintenance (Photo: Jimmy Chan, as seen in Living Architecture Monitor)

True and False

What Green Roofs Actually Do

Myth

- Green roofs cost too much and offer few if any benefits…



Vancouver Public Library (Photo: American Hydrotech)

True and False

What Green Roofs Actually Do

Reality

- Green roofs can be the better alternative when it comes to managing stormwater, to meet municipal site requirements.
- Green roofs protect building revenue streams, elevate property values, and attract building occupants.



Private residence, Sooke, BC (Photo: Architek Sustainable Building Products Inc.)

True and False

What Green Roofs Actually Do

The stormwater factor: it's all about capacity

- Like so many other cities, the City of Vancouver's sewer system has been outstripped by surface development
- Hardscapes have replaced so much natural absorbance that now, most rainwater had nowhere to go but in the stormwater system
- The Problem: as storm sewers become supercharged, they combine with sanitary sewer water and overflow the system, into public waters.
- Estimates by the CoV suggest that renewing sewer systems in key neighbourhoods could take up to 50 years, at an estimated cost of $50 billion!

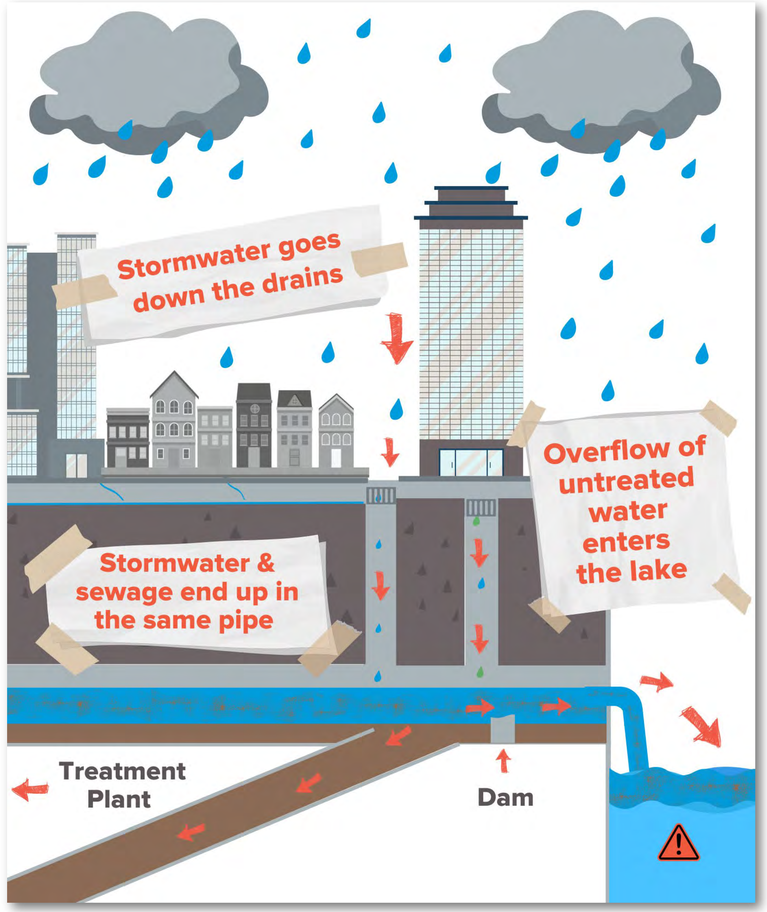


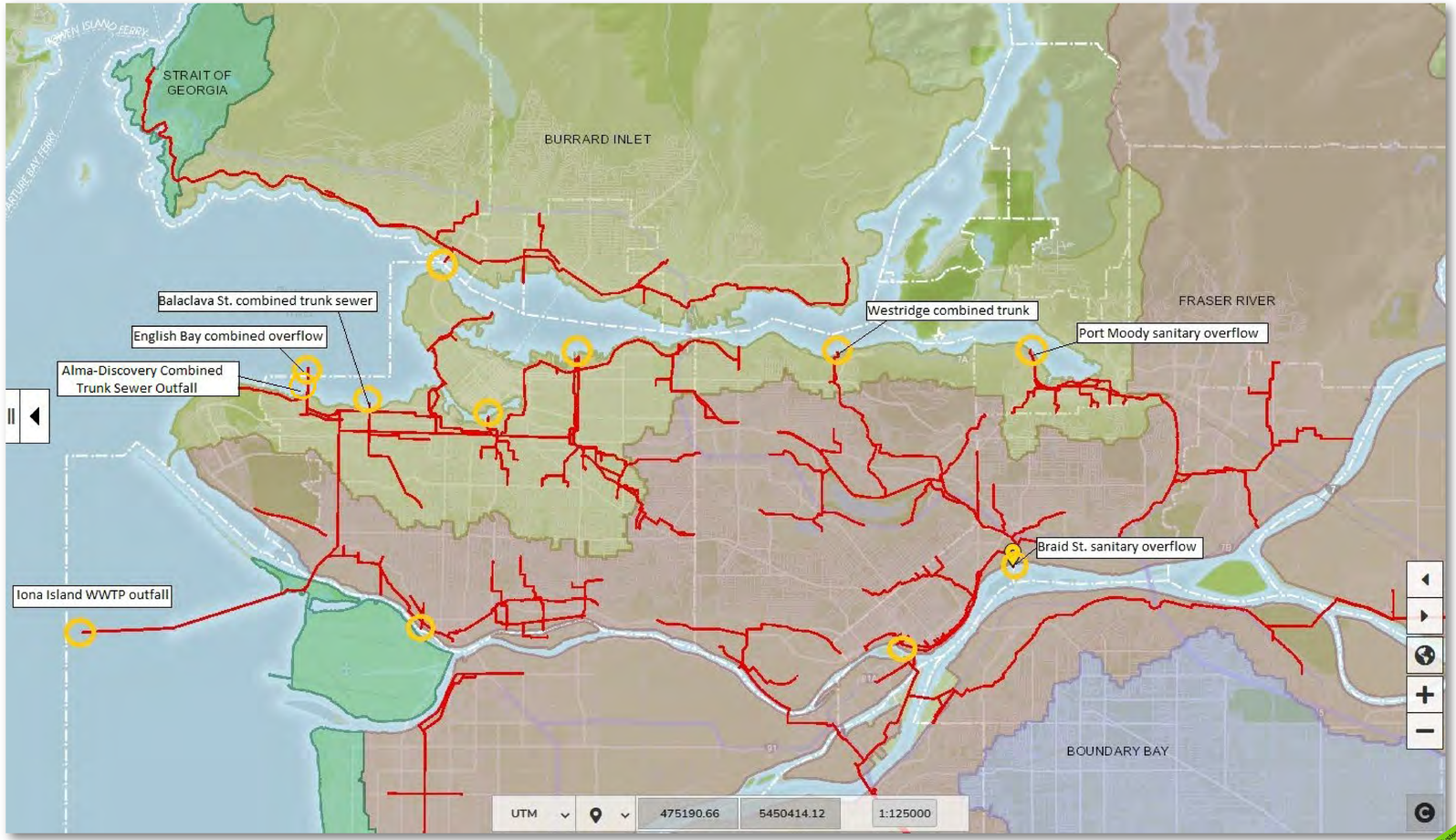
Image: Swim Drink Fish

True and False

What Green Roofs Actually Do

Fallout from outfalls

- Combined sewer overflows (CSO's) aren't unique to Vancouver, but they affect quality of life for everyone



City of Vancouver sewer outfall map

True and False

What Green Roofs Actually Do

A policy shift in 2024 that changed everything

- The Challenge:
  - address the problem of CSO's
  - Looking for alternatives to the costly, disruptive task of renewing infrastructure now
- The Plan:
  - shifted stormwater management away from the Zoning and Development By-law (this streamlined new building permitting)
  - relocated stormwater management (with changes) in Book II of the VBBL.

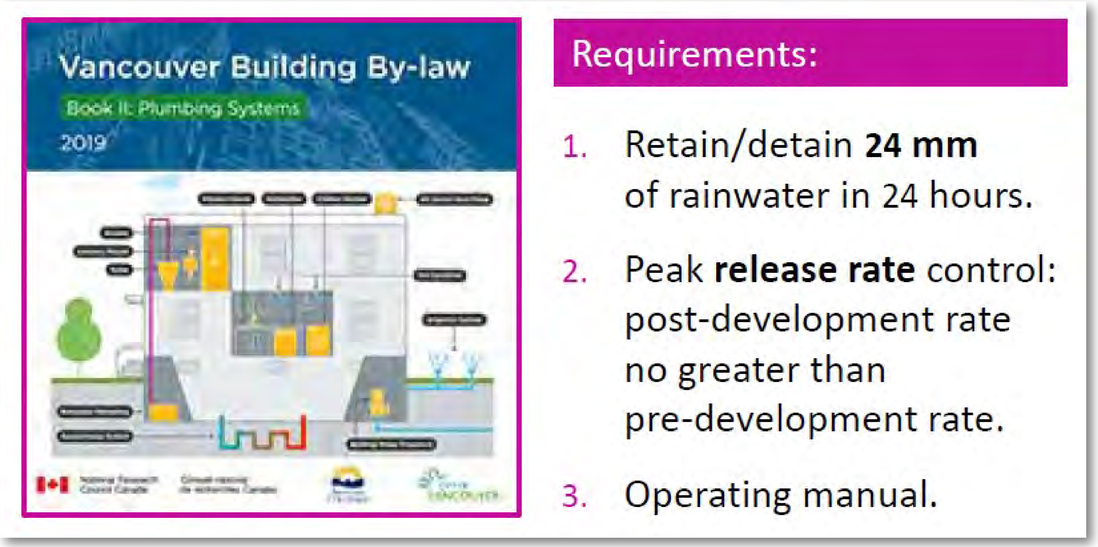


Image: City of Vancouver graphic

True and False

What Green Roofs Actually Do

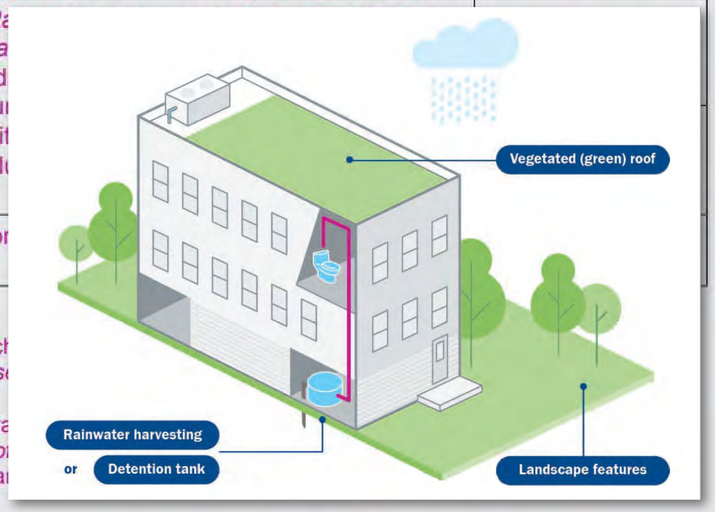
Stormwater Detention

- Stormwater detention volume reduction – the trade-offs:
  - ☆ Landscape feature (expensive, given the cost/value of land)
  - ☆ Vegetated roof system – leverages underutilized space
  - ☆ Water storage (i.e., larger detention tank – costly to maintain, not always reliable)

Table 2.4.2.5.
Permitted Reductions to the Detention Volume Requirement
Forming Part of Sentence 2.4.2.5.(2)

Retention or Other Practice	Reduction to the Detention Volume Requirement		
	Maximum Permitted Reduction Column A	Limit to Permitted Reduction Column B	Permitted Reduction Column C
Landscape feature(1)	Area of, and area routed to, the landscape feature multiplied by 24 mm	*Ra* *ra* med volu wit volu	
Vegetated roof assembly(2)	Area of, and area routed to, the *vegetated roof assembly* multiplied by 24 mm		
Alternate water source system	Area routed to the *alternate water source system* multiplied by 24 mm	Stor	

Notes to Table 2.4.2.5.:
(1) Or other *acceptable* ground-level or subsurface based practice, such
(2) Or other *acceptable* roof-top based practice. For *vegetated roof ass*
Book I (General) of this By-law.
(3) "*Rainwater* storage potential in the growing medium", "volume infiltra
within a subsurface reservoir layer" shall be demonstrated by *accep*
(4) For a *vegetated roof assembly* from which the runoff is directed to a
volume requirement shall equal Column A.



Large Image: City of Vancouver Building By-Law, Book II (Plumbing)
Inset Image: City of Vancouver graphic

True and False

What Green Roofs Actually Do

Beyond obligations to benefits

- Revenue – utilizing the roof for stormwater management doesn't impose on other potential revenue streams (think of lost parking revue if pursuing larger tanks)
- Value – visible green roofs elevate a building's value, attract occupants, and stimulate similar benefits for neighbouring Buildings



Images: RCABC Image Library

True and False

What Green Roofs Actually Do

- Sound – green roofs can reduce (attenuate) sound intrusion through the roof (noticeable on wood framed buildings)
- Heat and Cold – green roofs complement a well-insulated roof to buffer the effects of heat waves and cold spells
- Healthy buildings – by doing all of these things, green roofs promote healthy, habitable spaces, an objective in the Building Code.



Hugh Garner Coop, Toronto (Photo: Vivain Lynch)

True and False

What Green Roofs Actually Do

And there's more!

- Green roofs help reduce air temperature
- Green roofs absorb CO_2 from the air
- Green roofs improve the diversity of life living in cities (biodiversity)

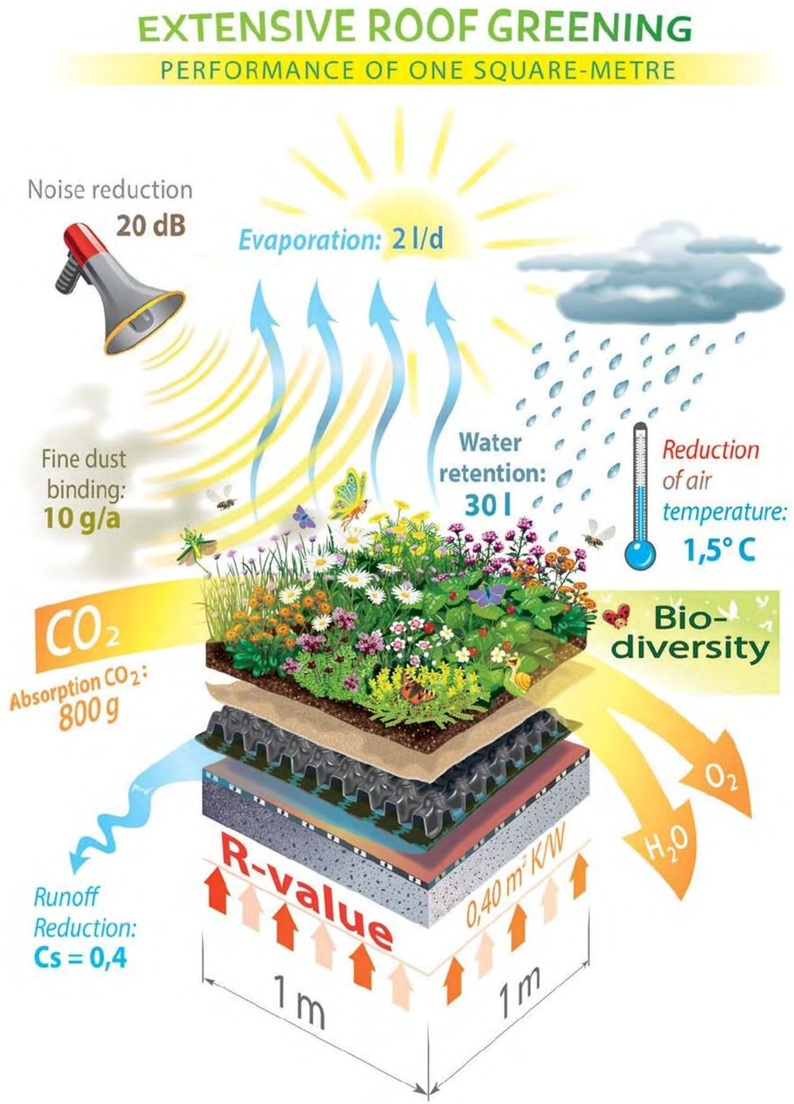


Image by BuGG (Bundesverband GebäudeGrün e.V.), 2020

True and False

What Green Roofs Actually Do

A green roof doesn't have to break the bank

- A pre-grown extensive green roof typically costs between $15 and $35 per square foot (costs can be higher, depending on project location, size, accessibility, and complexity)
- Recaptured costs – because green roofs preserve the serviceability of the roof membrane and leverage underutilized roof space, green roofs (a one-time capital expense that doesn't require renewal over the life of the roof) can defer roof renewal by decades while simultaneously improving revenue.



Oak Park Library, Chicago (Photo: Bruce Unruh, American Hydrotech)

True and False

What Green Roofs Actually Do

Myth

- Green roofs damage and shorten the service life of the roofing that supports them.



Membrane damage from roofs (Photo: RCABC Image Library)

True and False

What Green Roofs Actually Do

Reality

- Properly designed and constructed green roofs
  - ☆ protect roofing from damage – e.g., thrown, falling, or dropped objects,
  - ☆ Separate plants from the roof membrane, and
  - ☆ shield the roof from aging.



Apartments adjoin the green roof on top of the Loblaws store, North Vancouver
(Photo: RCABC Image Library)

True and False

What Green Roofs Actually Do

Protection that's built in…

- Root barriers are necessary even for gentle sedums, and they offer extra insurance in case maintenance is missed (required even for sedums).
- Drainage layers promote good drainage and protect the roof membrane from accidental damage.
- Separation Zones (vegetation-free boundary areas) and edge metal protect roof system details from vegetation and from accidental damage during rooftop maintenance.



A sedum roof without a separation zone (and root barrier), and (inset) resulting root damage to membrane (Photo: RCABC Collection)

True and False

What Green Roofs Actually Do

The case for membrane longevity:

- In 2021, Soprema Inc. sampled a 20-year-old roof membrane from beneath their own green roof system and found that the roof membrane had been so well preserved that its condition was as good or better than new membranes still in their packaging. You can read about it here: https://blog.soprema.us/one-of-the-oldest-extensive-green-roofs-in-north-america



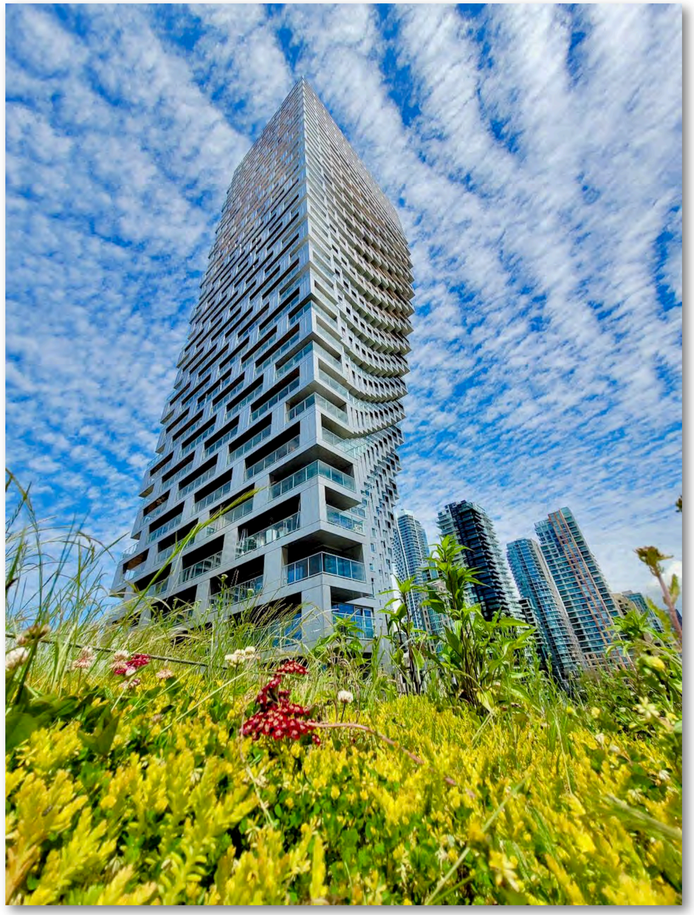
The former MEC headquarters roof, Toronto (Photo: Greenroofs.com)

True and False

What Green Roofs Actually Do

Green roofs prolong membrane life because they are cooler and more stable than exposed membrane roofs

- Thermography shows that *vegetated roof systems* are cooler than surrounding roof materials, **and** they keep the roof beneath them cooler and temperature-stable.
  - Daily thermal swings and shock, more than UV, degrade roof membranes.
  - As roof membranes expand and contract from thermal cycling, they wear out, losing their elasticity.



Vancouver House
(Photo: Architek Sustainable Building Products Inc.)

True and False

What Green Roofs Actually Do

Myth

- Green roofs make buildings more vulnerable to water damage inside.



YMCA, Toronto (Photo: Vivian Lynch)

True and False

What Green Roofs Actually Do

Reality

- Because green roofs protect the roof membrane from damage, and they are designed to capture and drain water from the roof, they reduce the risk of leaks.



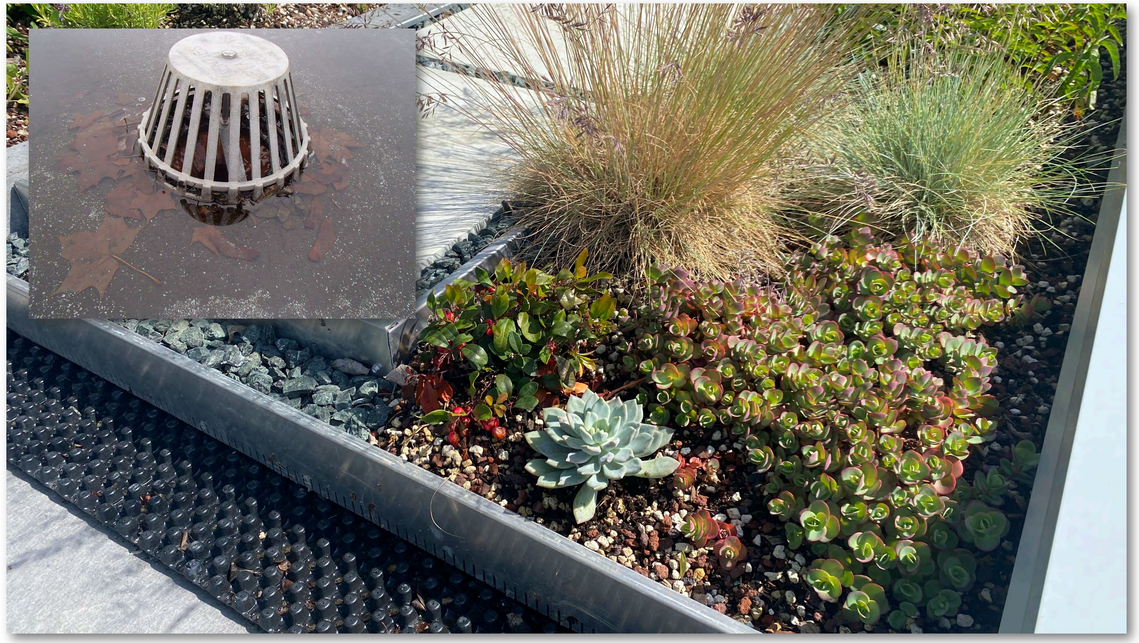
City Hall, Toronto (Photo: Vivian Lynch)

True and False

What Green Roofs Actually Do

Green roofs are designed to provide a controlled approach to stormwater management.

- During heavy rains (now common during the winter months in BC's coastal regions), green roofs protect roof drains from floating debris that can block strainers and cause backups.
- Green roofs slow down the flow of rainwater moving toward drains – this protects drainpipes from supercharging during significant downpours.



Main Image: ZinCo Canada test plot, Langley, BC
Inset: leak litter can plug roof drains on exposed membrane roofs that aren't protected by a vegetated roof with separation zones.
(Photos: RCABC Image Library)

True and False

What Green Roofs Actually Do

Green roof maintenance: the wildcard

- Green roofs must be maintained. Period. An unmaintained green roof is a hazard to the roof, but a maintained green roof
  - ☆ Ensures invasive plants won't take hold,
  - ☆ Keeps separation (boundary) zones plant-free,
  - ☆ Checks and ensures roof drains remain free-flowing, and
  - ☆ Reviews the waterproofing roof for any issues that deserve immediate attention.



St. Michael's green roof, Victoria. Note the blackberries which definitely aren't part of the original green roof profile. This roof seriously lacks maintenance (Photos: RCABC Image Library)

True and False

What Green Roofs Actually Do

Myth

- Green roofs are a fire hazard.



A controlled burn of the green roof on the Ducks Unlimited Oak Hammock Marsh Interpretive Centre (Photo: Tye Gregg, Ducks Unlimited Canada)

True and False

What Green Roofs Actually Do

Reality

- Green roofs resist fire and reduce fire and flame spread, sparing buildings from significant damage or total loss.



Fire Station, Grindelwald, Switzerland (Photo: ZinCo GmBH)

True and False

What Green Roofs Actually Do

Most structure fires during wildfire events occur from **falling fire brands.**

Green roofs provide a protection layer, resisting fire spread.

- Sedum-based extensive vegetated systems are naturally fire resistant (sedums are succulents) and won't support sustained burning
  - https://www.mdpi.com/2075-5309/10/7/126

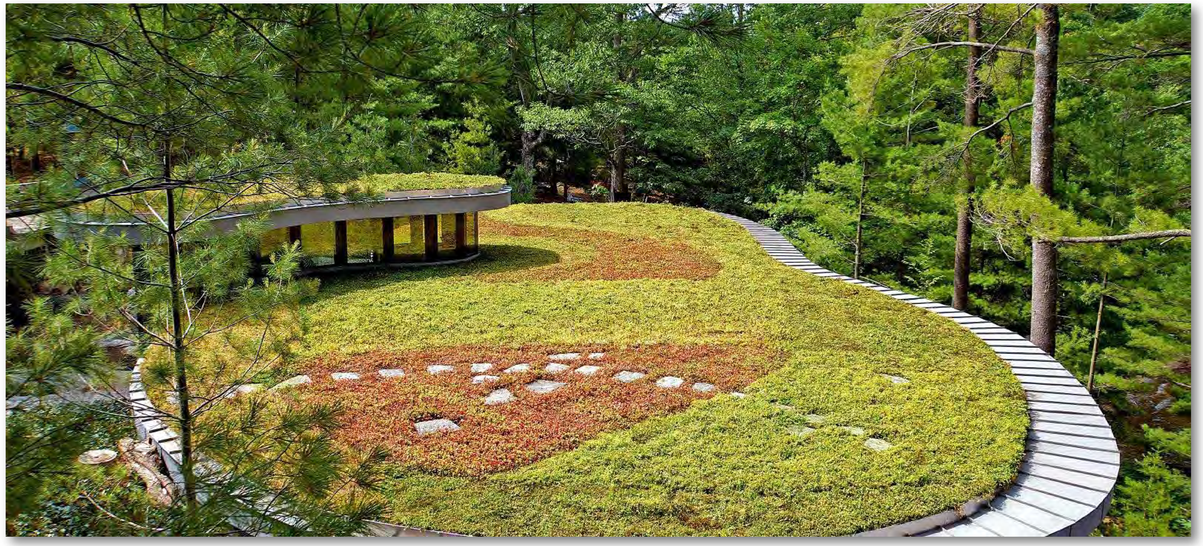


Image: ZinCo Canada (Used with permission)

True and False

What Green Roofs Actually Do

Green roof growing media is not prone to combustibility.

- While growing media blends vary, they all hold moisture even during periods of drought, and are highly mineralized so that they cannot sustain combustion.
  - https://livingarchitecturemonitor.com/articles/green-roofs-fire-su21



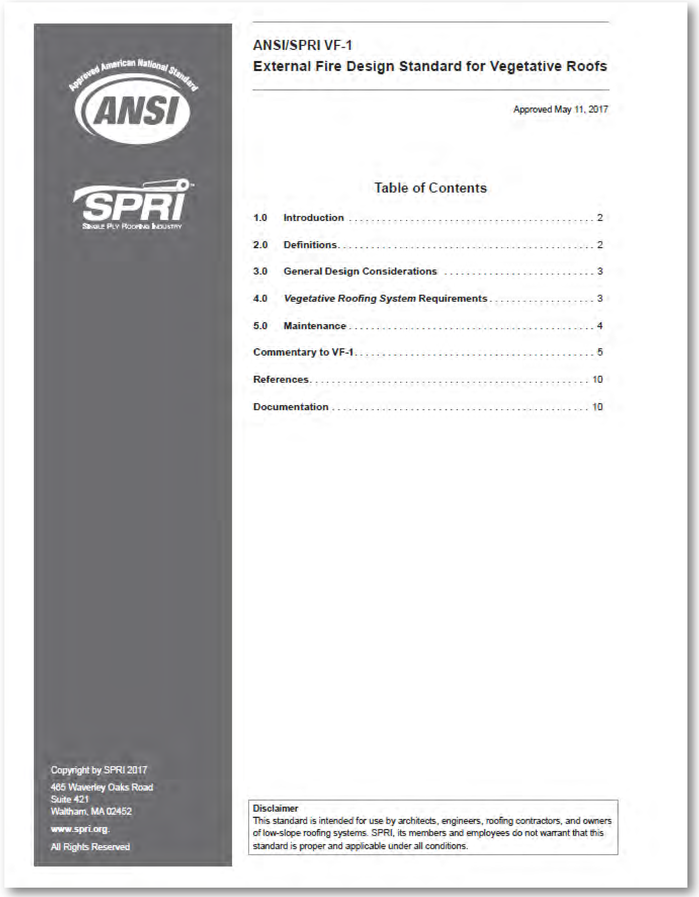
Growing media installed during green roof training
(Photo: RCABC Collection)

True and False

What Green Roofs Actually Do

Green roofs can be designed to resist fire.

- Green roofs can be designed for risk reduction using ANSI/SPRI VF-1, “External Fire Design Standard for Vegetative Roofs”.
- Recent wildfires in California have moved jurisdictions like the City of Los Angeles to incorporate ANSI/SPRI VF-1 in their own building code.
- For an analysis of fire design in green roofs, read
  - https://livingarchitecturemonitor.com/articles/green-roofs-and-fire-resilience-extending-defensible-space-above-ground-level-su25


ANSI/SPRI VF-1
External Fire Design Standard for Vegetative Roofs
Approved May 11, 2017
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Disclaimer
This standard is intended for use by architects, engineers, roofing contractors, and owners of low-slope roofing systems. SPRI, its members and employees do not warrant that this standard is proper and applicable under all conditions.

ANSI/SPRI VF-1 Standard

True and False

What Green Roofs Actually Do

Smarter designs make buildings safer

- The latest fire prevention standard for green roofs is published by the Green Roof Organization (**GRO**), UK (Best Practices Guide, June 2025).
  - **GRO** recommends non-combustible margins as fire breaks (with specified stone sizes) **no less than 500 mm** wide;
  - The **RGC Standard for Vegetated Roofs** requires non-combustible separation zones at exterior walls and other significant plane changes **no less than 914 mm** wide.



Thriving sedum mats on the training roof installation at RCABC, Langley (Photo: RCABC Collection)

Building a Greener Future

How the RoofStar Vegetated Roof Guarantee Works

So, how can green roofs be built like that?
First, you need a good recipe:

- Collaboration & cooperation
- Control over quality
  - Committed installers who take responsibility for their work
  - Training, and minimum competency requirements
  - An objective, rational, enforceable Standard that limits or even prevents value engineering
  - Pre-qualified systems
- Someone to oversee and assure quality



Training tomorrow's green roof installers
(Photo: RCABC Image Library)

Building a Greener Future

How the RoofStar Vegetated Roof Guarantee Works

RCABC's recipe for reliable green roofs

- ☆ Controls the design and construction process through a rigorous Standard, committed members, and trained installers,
- ☆ Reduces and even eliminates value engineering opportunities through tight requirements and limited substitutions,
- ☆ Leverages proven green roof systems to avoid system failures,
- ☆ Assures quality with independent observers, and
- ☆ Requires regular maintenance (in fact, it's paid for upfront, before construction)



Unmaintained roofs like this one can ruin even the best of intentions
(Photos: RCABC Image Library)

Risk-managed Green Roofs

The RoofStar Vegetated Roof Guarantee Program

Risk-managed Green Roofs

The RoofStar Vegetated Roof Guarantee Program

The Building Code isn't directly concerned with quality, so it says nothing about it.

- Minimum mandatory requirements for buildings cover four broad Objectives (Div. A, Article 2.2.1.1.):
  - ☆ **Safety**
    - ✓ Fire; Structural; Use; Access During Construction
  - ☆ **Health**
    - ✓ Indoor Conditions; Sanitation; Noise; Vibration; Hazardous Substances
  - ☆ **Fire and Structural Protection**
    - ✓ Of the Building; Structural Sufficiency; Protection from fire and structural damage
  - ☆ **Environment**
    - ✓ Energy Efficiency; Greenhouse Gases



Risk-managed Green Roofs

The RoofStar Vegetated Roof Guarantee Program

Not everything is mandatorily inspected during building construction

- Basic course-of-construction inspections cover the following, but roofing isn't one of them:
  - Footings & foundation; foundation drainage; plumbing and insulation under slab
  - Framing, sheathing
  - Plumbing & mechanical
  - Electrical
  - Fire separation
  - Insulation and vapour control
  - Air control testing



Risk-managed Green Roofs

The RoofStar Vegetated Roof Guarantee Program

Roofing and Green Roofing are not Mandatory Trades

- Only seven trades are recognized in BC as compulsory trades (must be registered and certified):
  - **Electricians (Construction, Industrial, Powerline)**
  - **Refrigeration and AC Mechanics**
  - **Gasfitters**
  - **Pipefitters**
  - **Sheet Metal Workers (HVAC)**

Risk-managed Green Roofs

The RoofStar Vegetated Roof Guarantee Program

So, where does that leave roofing?

- Registered, certified tradespeople aren't required.
- Code inspections are non-existent.
- Standards are voluntary.
- Quality reviews aren't mandatory.

But it doesn't have to be that way…



Risk-managed Green Roofs

The RoofStar Vegetated Roof Guarantee Program

- Where the Building Code and inspections offer no help, RCABC's risk-managed program for roofing **stands in the gap** to control and assure quality for the owner.
- Five key policy-driven cornerstones:
  - ☆ **Membership** (QC)
  - ☆ **Qualified Installers** (QC)
  - ☆ **Standards** (QC)
  - ☆ **Accepted Materials** (QC)
  - ☆ **Independent Observations** (QA)

RoofStar

GUARANTEED. BETTER.

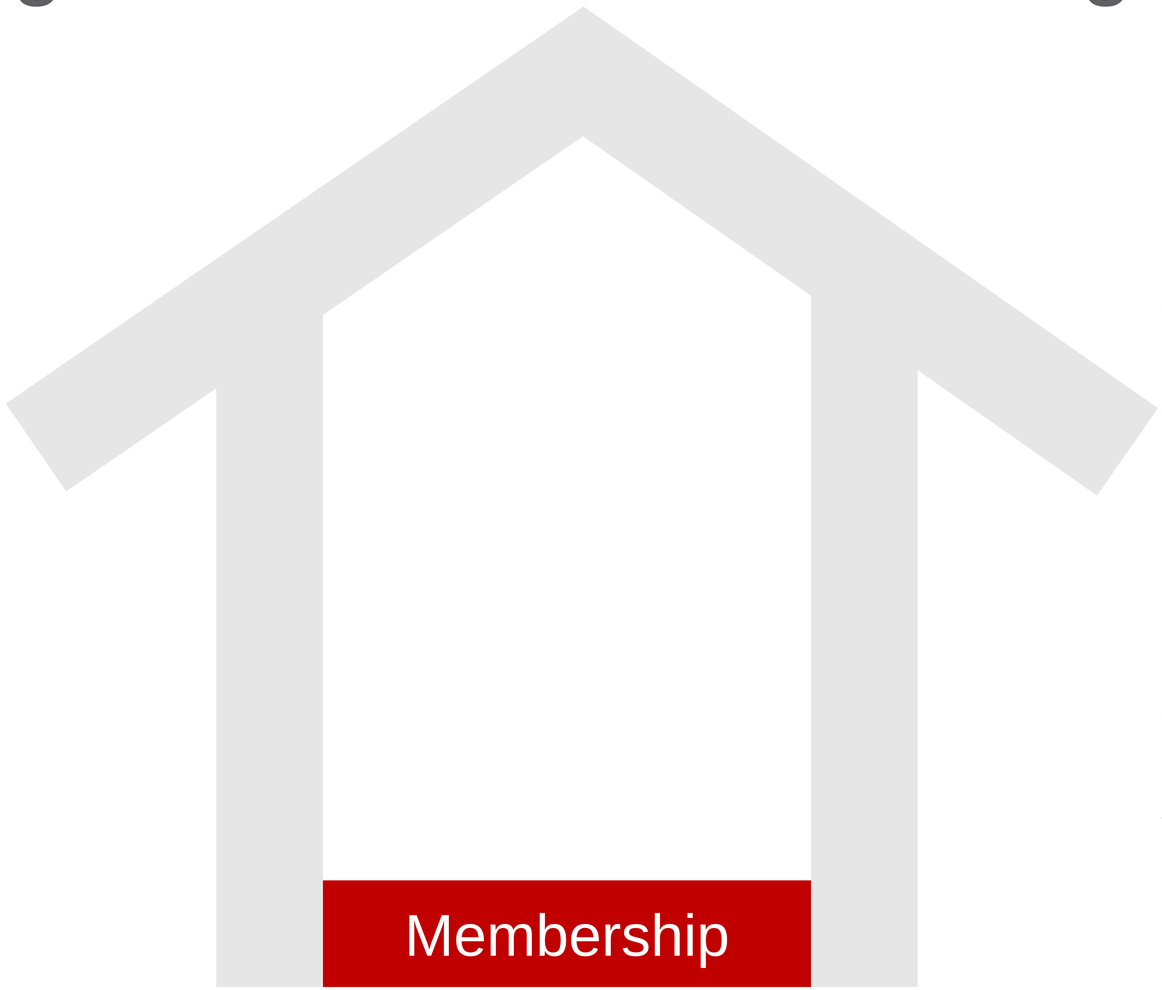
Risk-managed Green Roofs

The RoofStar Vegetated Roof Guarantee Program

Quality Control

❖Membership

- ☆Everything works because those who build the roof, and those who make the materials, belong to the RCABC, and take responsibility for their work.



Membership means commitment – a commitment to work in the same direction: to uphold RCABC policy, follow published Standards, use RGC-accepted materials, employ qualified people, and train those who aren't.

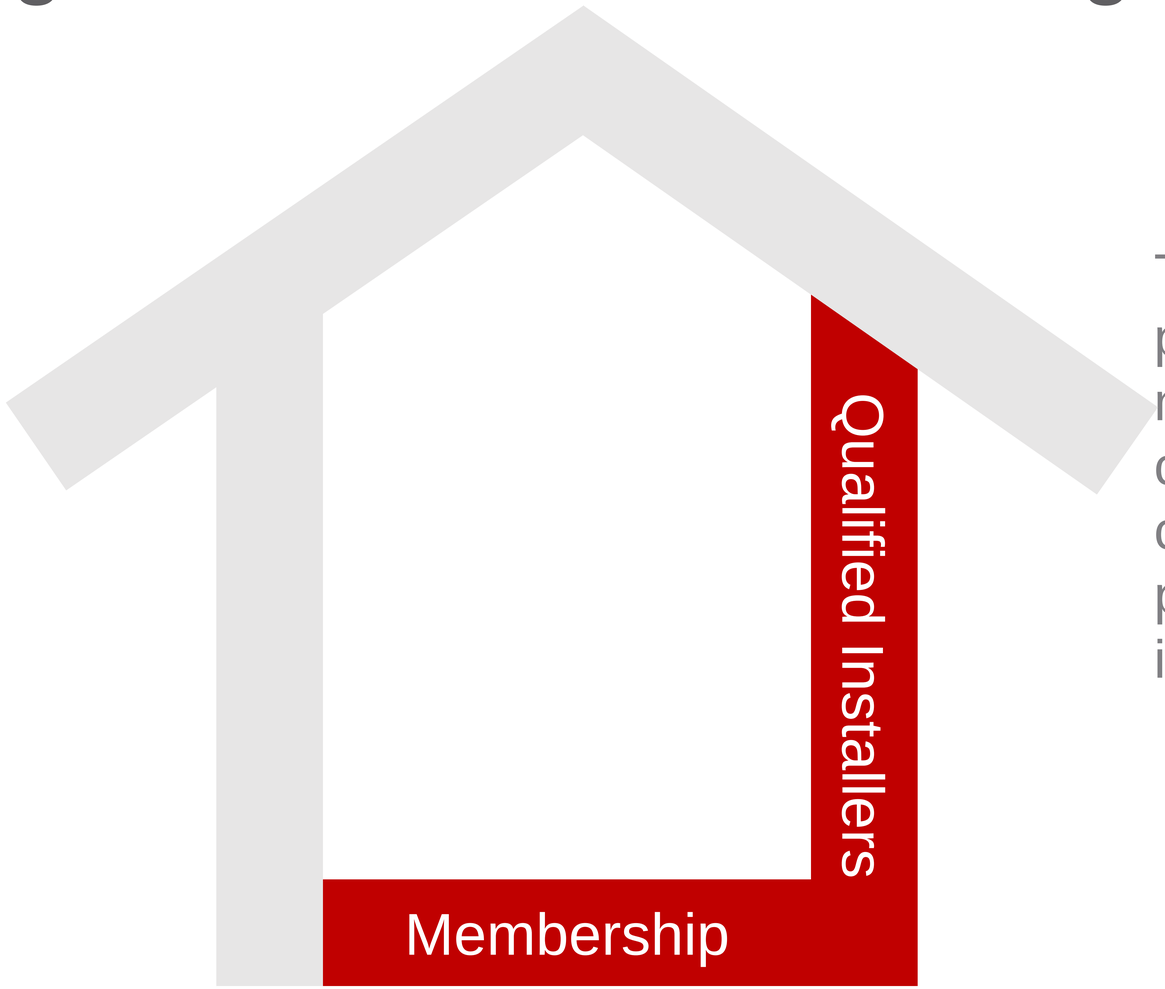
Risk-managed Green Roofs

The RoofStar Vegetated Roof Guarantee Program

Quality Control

❖Qualified Installers

- ☆Roofing is complicated, complex work. It takes professional roofers to properly install a roof.



To ensure every roof is professionally built, our member contractors commit to having certifiably trained people on site to build it.

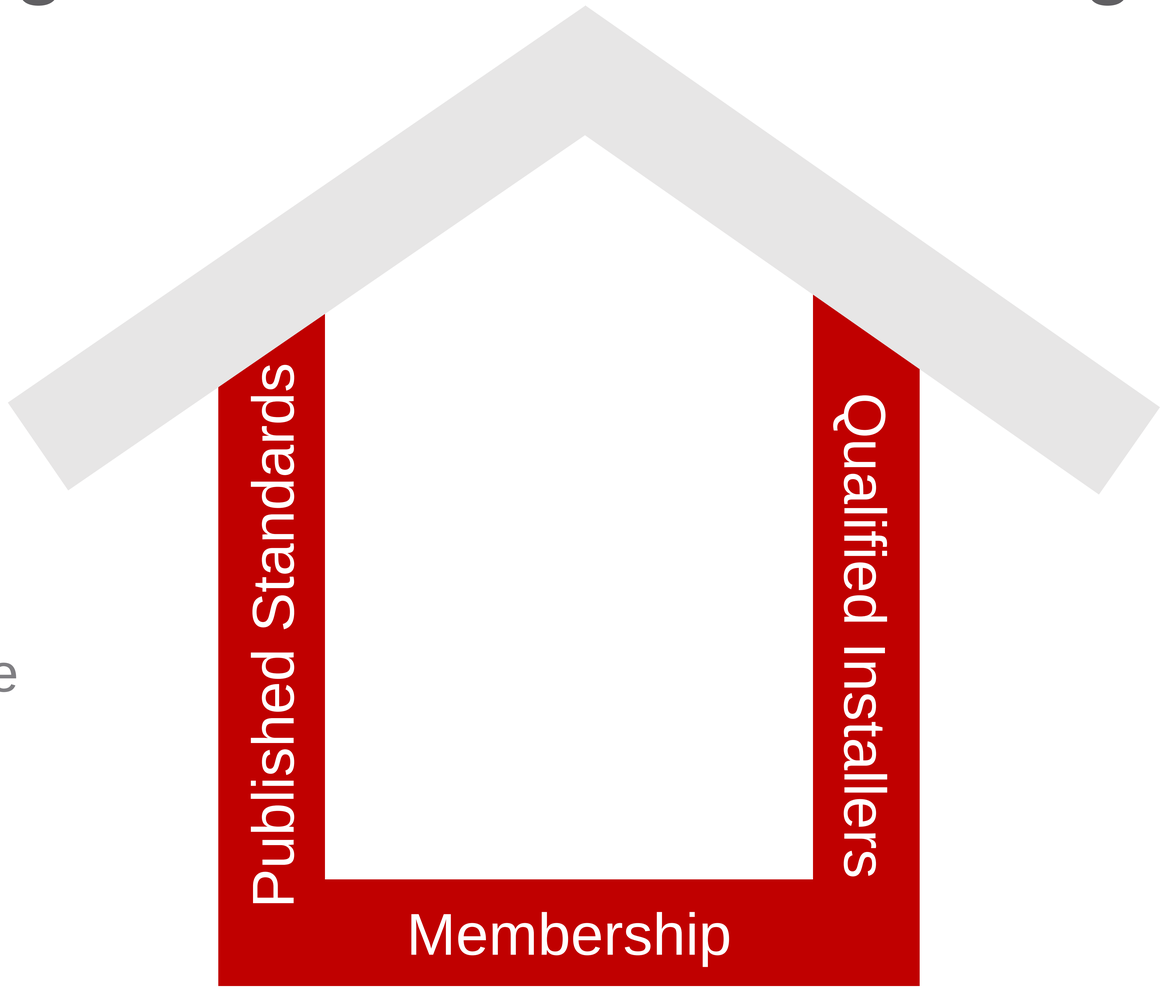
Risk-managed Green Roofs

The RoofStar Vegetated Roof Guarantee Program

Quality Control

❖Standards

- ☆ Every project must comply with an RGC published Standard. All our Standards are written expressly to support the RoofStar Guarantee Program.



When an RCABC Member contractor builds a roof, they commit to following the RGC Standards, ensuring that owners meet this critical requirement of the RoofStar Guarantee Program.

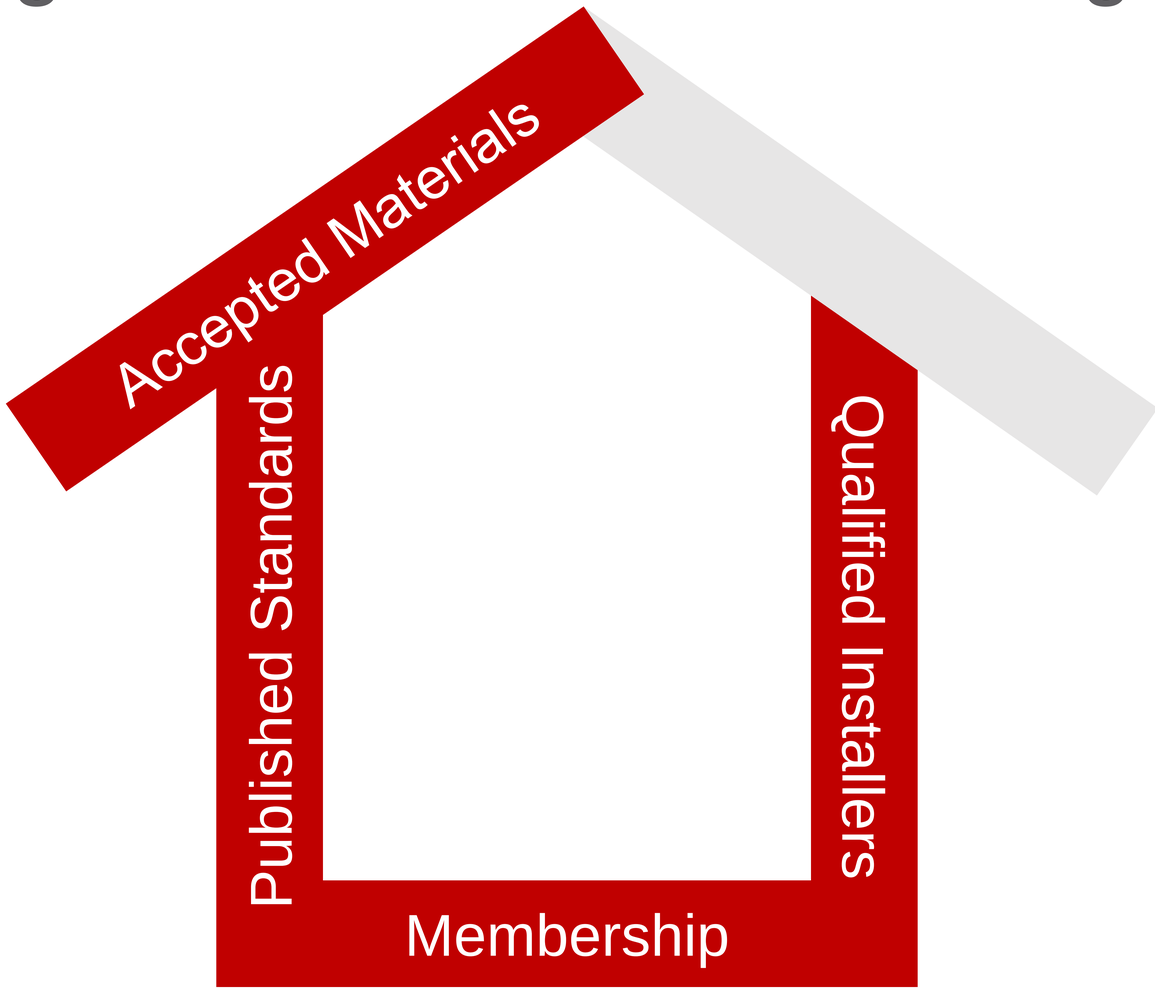
Risk-managed Green Roofs

The RoofStar Vegetated Roof Guarantee Program

Quality Control

❖Accepted Materials

- ☆Only materials accepted by us (RGC) are acceptable for installation.



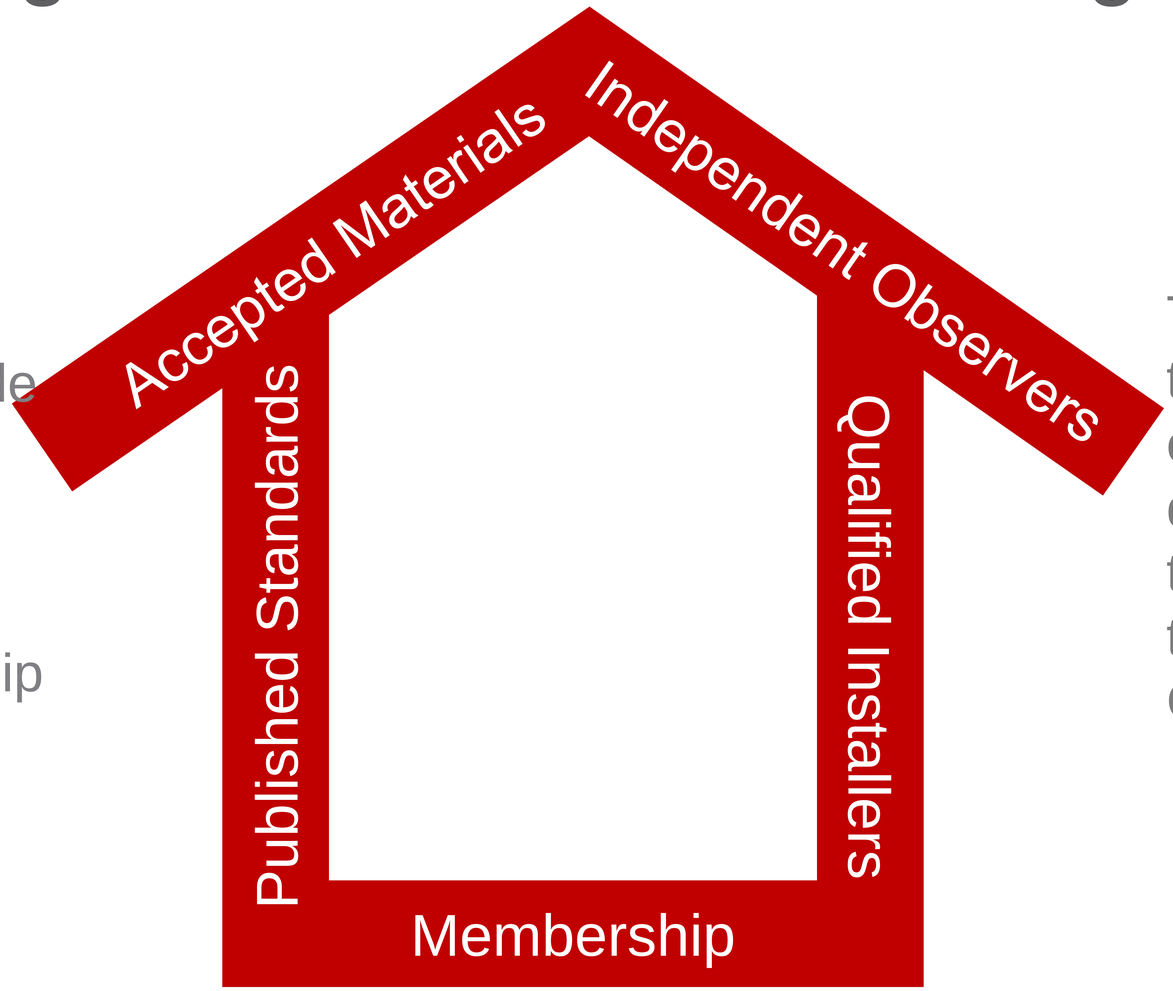
‘Accepted’ simply means that they’re trustworthy when used in our Guarantee Program because they meet our requirements and are backed by the RCABC member manufacturers who make them.

Risk-managed Green Roofs

The RoofStar Vegetated Roof Guarantee Program

Quality Assurance

- **Independent Observations**
  - ☆ Independent observations provide quality assurance. RGC-accepted Observers are truly independent – they have no membership standing in the RCABC.

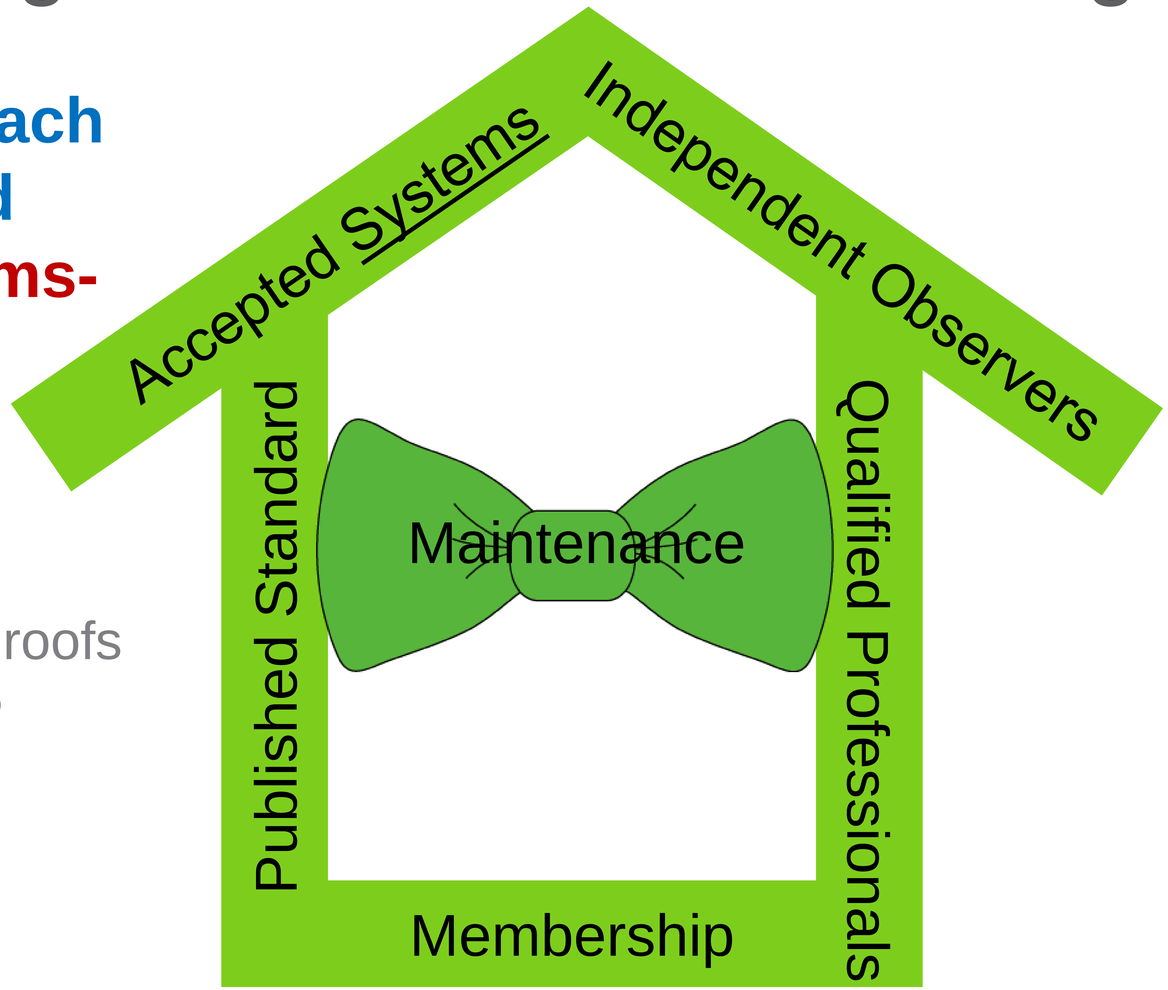


They are qualified through an independent organization (IIBEC) to do their work and trained by the RCABC in the ways of the RoofStar Guarantee Program.

Risk-managed Green Roofs

The RoofStar Vegetated Roof Guarantee Program

Same QA/QC approach applies to vegetated roofs, but it's systems-focused rather than material-based.



Our Guarantee for green roofs is founded on the same 5 keystones, …neatly tied together with required maintenance.

Risk-managed Green Roofs

The RoofStar Vegetated Roof Guarantee Program

- Launched November 2024
- Offered for a 2-year term
- Available as an add-on Guarantee for roofs carrying a new RoofStar Guarantee (RoofStar 5/10/15-year)



Vancouver Convention Centre (Photo: RCABC Image Library)

Risk-managed Green Roofs

The RoofStar Vegetated Roof Guarantee Program

- Green roof systems are warrantied by the supplier – the RoofStar Guarantee
  - provides joint coverage and claims management just like we do with the waterproofing roof, and
  - fosters visibility and brand recognition in the marketplace
- Only RGC-accepted Systems can be specified and built. We won't permit an *à la carte* approach to green roof design and construction.
- The Qualified Green Roof Installer maintains the green roof and is paid by the RGC as maintenance is performed and documented.

Risk-managed Green Roofs

The RoofStar Vegetated Roof Guarantee Program

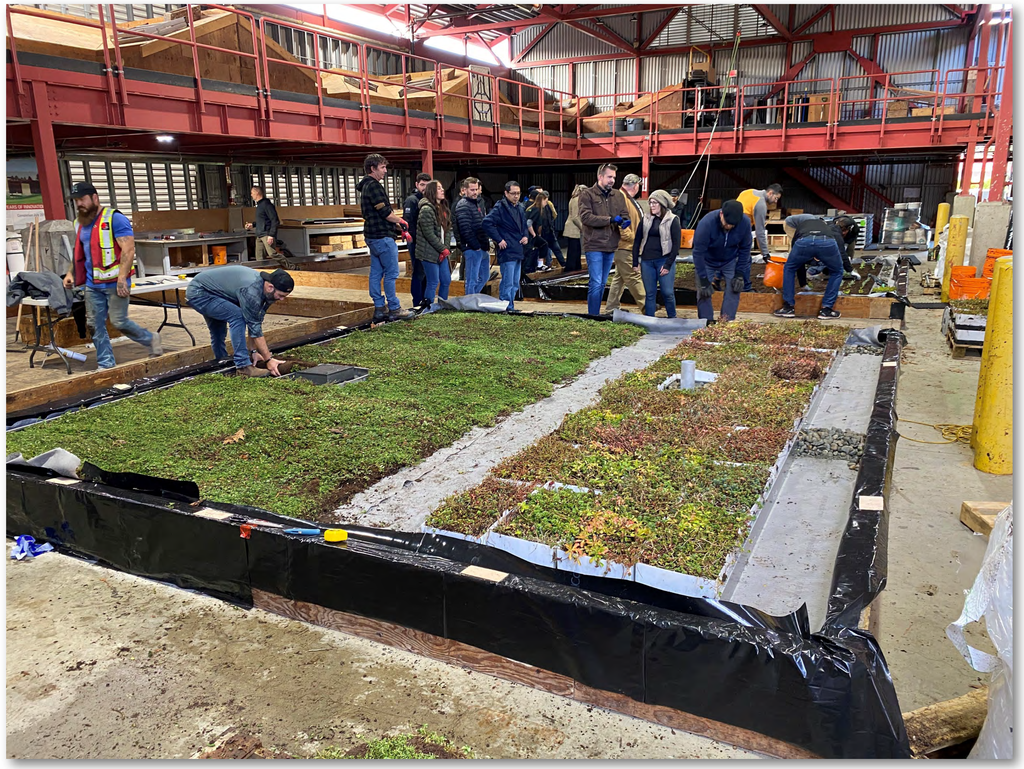
- Coverage under a RoofStar Guarantee is just like the warranty coverage offered by the supplier:
  - Performance of the components is covered for the term of the Guarantee (2 years).
  - We cover vegetation, but only when the system is extensive and only when the vegetation is pre-grown in trays or mats – if it doesn't achieve at least 80% surface coverage by the end of year 2, we'll pay to have that repaired.
  - Leaks in the supporting roof assembly are covered, subject to the limits in Division A of the RPM

Risk-managed Green Roofs

The RoofStar Vegetated Roof Guarantee Program

We train our Members

- Only RCABC Active (contractor) members with trained Project Managers (PM) can deliver a RoofStar Vegetated Roof Guarantee
- Only RGC-qualified green roof installers may install and maintain a green roof covered by a RoofStar Guarantee:
  - may be an Active or Affiliate Member
  - minimum training requirements – GRIMP or equivalent; must have a PM on staff.
  - We provide installation and maintenance training at our Langley facility.
  - Surety bonds backstop our Guarantee.



Green Roof Installation and Maintenance Profesional training day (Photo: RCABC Collection)

Risk-managed Green Roofs

The RoofStar Vegetated Roof Guarantee Program

RGC's Standard for green roofs:

- Every project that receives a RoofStar Guarantee is governed by and must comply with the RGC published Standard:
  - Collaboratively developed with industry professionals to bring together requirements & best practices that reduce risk for owners and the RGC.
  - Addresses design, systems and materials, application, and development maintenance.
  - Lauded by others in the green roof industry as the most comprehensive Standard of its kind in North America.



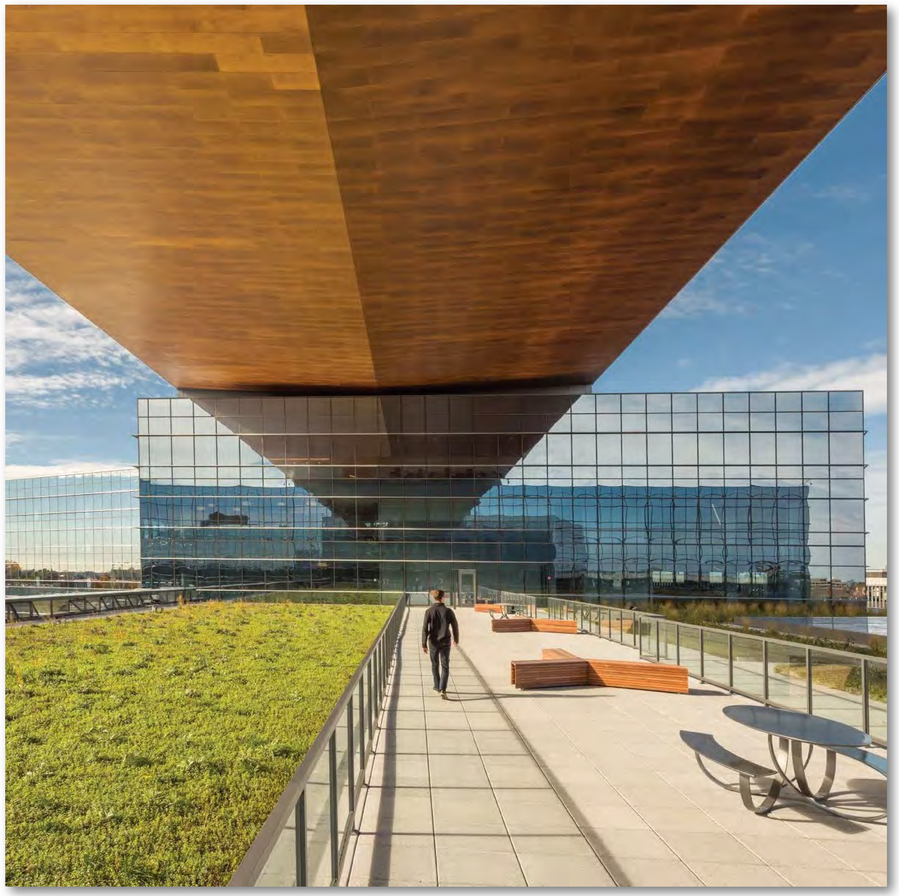
City of Surrey Public Library (Photo: Bob Young)

Risk-managed Green Roofs

The RoofStar Vegetated Roof Guarantee Program

A Standard written for success:

- Based on successful standards used worldwide, including the German “FLL” standard published by Landscape Development and Landscaping Research Society e.V.
- Carefully crafted to eliminate value engineering of key components, such as
  - Growing media
  - Drainage courses
  - Edging metal
  - Filtration materials



Zurich Insurance headquarters, North America (Photo: Zurich Insurance Company Ltd.)

Risk-managed Green Roofs

The RoofStar Vegetated Roof Guarantee Program

Clear, objective, rational requirements

- Comprehensive, informative (non-binding) notes complete the Standard.
- Clearly articulated requirements for every essential aspect of a green roof, including
  - Securing the green roof system against wind loads
  - Root barrier – what is permissible, how it must be installed
  - Separation zones around perimeter and details, and what to fill them with
  - Water (drainage) and vapour management (including planters)

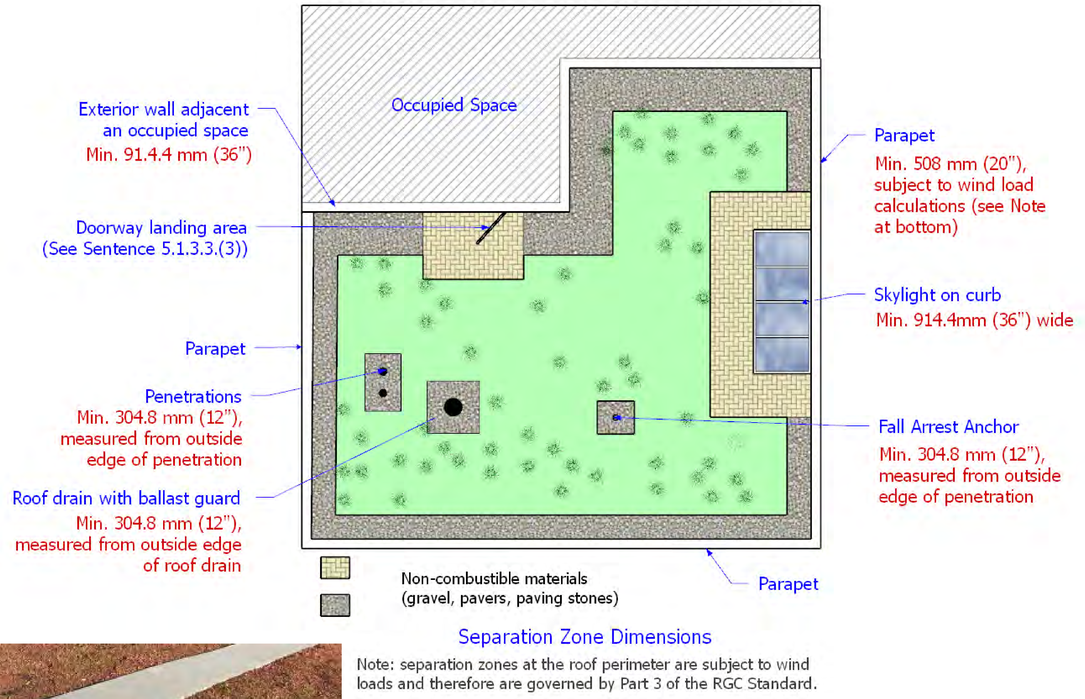


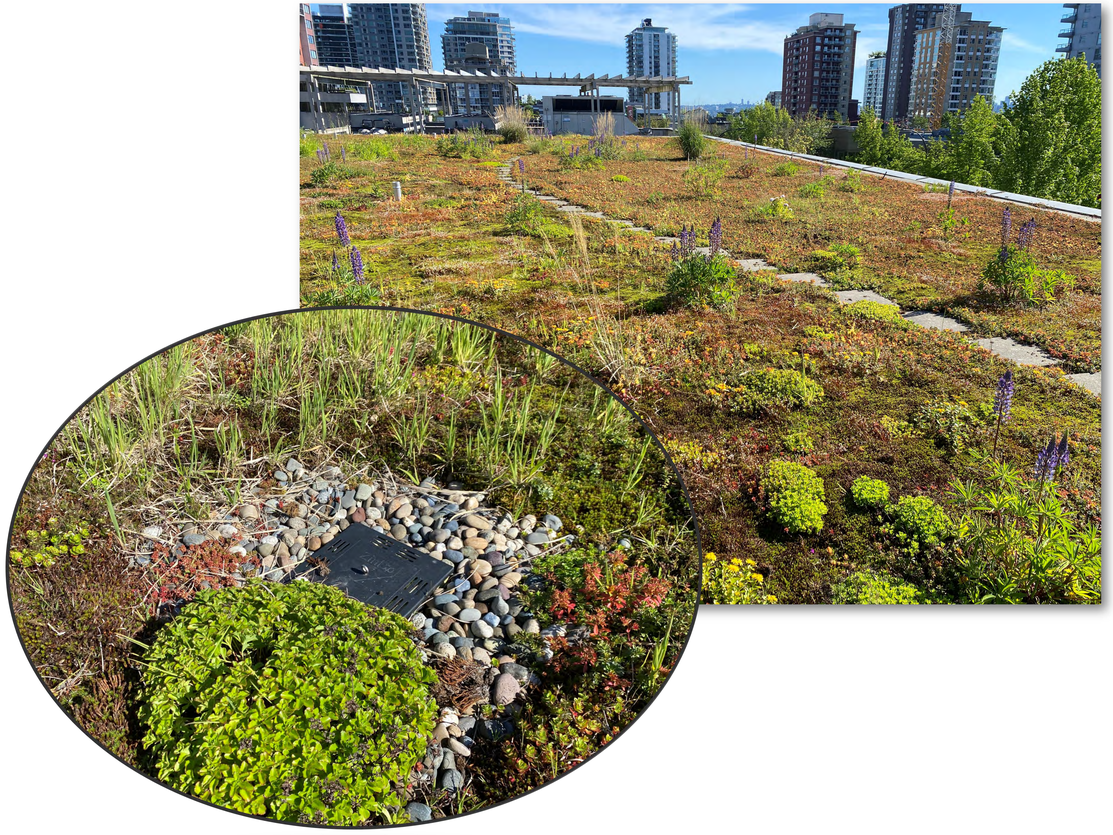


Figure 5.1.3.3., Separation Zones (From the Standard for Vegetated Roofs)
Inset: Separation Zone (Photo: Architek Sustainable Building Products Inc.)

Risk-managed Green Roofs

The RoofStar Vegetated Roof Guarantee Program

- We dive deeper…
  - ☆ growing media:
    - ✓ Which blends are permissible;
    - ✓ Quality control for blending;
    - ✓ Protection of media from erosion;
    - ✓ Min. depth requirements for intensive and semi-intensive systems (some exceptions allowed)
  - ☆ Irrigation
  - ☆ Vegetation supply, installation
  - ☆ Service/maintenance requirements
  - ☆ Goats, bees, and other green roof companions (yes, even chickens)



Loblaws Lonsdale, North Vancouver (Photo: RCABC Collection)

Risk-managed Green Roofs

The RoofStar Vegetated Roof Guarantee Program

A Collaborative Effort

- The RCABC is grateful for the support of the roofing and green roofing industries across North America, for their contributions
- We were privileged to work with an amazing group of volunteers who dedicated their expertise and enthusiasm to build an exceptional Standard

Advisory Committee

Torsten Ball – JRS Engineering (Burnaby, BC)
Denis Gingras – Hydrotech Corp. (Montreal, PQ) – now retired
Chris Bourgault – Duron Specialty Contracting Group Ltd. (Burnaby, BC)
Brandon Goedecke – Flynn Canada (Surrey, BC)
Chris Kann – Carlisle Syntec (Carlisle, PA)
Christian Mahlstedt – Ginkgo Sustainability (Toronto, ON)
Roxanne Miller – Soprema Canada (Montreal, PQ)
Nastaran Moradinejad – PFS Studio (Vancouver, BC)
Elizabeth Hart Morris – Green-Up LLC (Portland, OR)
Colin Tougas – Morrison Hershfield/Stantec (Burnaby, BC)
Ryan Vasseur – Architek Sustainable Building Products Inc. (Vancouver, BC)
Jeremy Wright – ZinCo Canada | design (Toronto, ON)
Pearl Yip – PWL Partnership (Vancouver, BC)
Julia Polevaya – ZinCo Canada (formerly head of ZinCo Ukraine) (Metro Vancouver, BC)

Risk-managed Green Roofs

The RoofStar Vegetated Roof Guarantee Program

Accepted Systems:

- No matter how simple or complex, we guarantee only *green roof systems* supplied by member manufacturers and accepted by the RGC:
  - Systems are available for nearly every configuration of green roofing.
  - Systems can be paired with integrated solar supports and accessories.
  - System manufacturers must provide hydrological performance metrics for their systems, to show that they meet local municipal rainfall detention and retention requirements.



Photovoltaics and vegetated roofing (Photo: ZinCo Canada Inc.)

Risk-managed Green Roofs

The RoofStar Vegetated Roof Guarantee Program

- 5 VR system manufacturers
- Around 40 systems currently accepted by the RGC
- 3 more systems, by another manufacturer, are up for review and acceptance by the RGC

Vegetated ("Green") Roof Systems (VRS)

Vegetated Roof Systems

Click on a manufacturer's name to see the full list of their vegetated roof systems accepted for use in the RoofStar Guarantee Program. Click on the System Name to see the materials and documentation for the system.

To reset this page to its original view, click your browser refresh button.

VRS Supplier	VR System Name *	VRS Type †	Permissible Roof Assembly†	System Min. Depth mm (in) ‡	System Max. Depth mm (in)	Media Min. Depth mm (in) ‡	Media Max. Depth mm (in)
Carlisle SynTec Systems Canada	Carlisle Extensive Roof Garden System	Extensive	All	101.6 (4)	158.8 (6-1/4)	70 (1-1/4)	127 (5)
Carlisle SynTec Systems Canada	Carlisle Roof Garden Extensive Stormwater Retention System	Extensive	All	140 (5-1/2)	165.1 (6-1/2)	101.6 (4)	127 (5)
Carlisle SynTec Systems Canada	Carlisle Semi-Intensive Roof Garden System	Semi-Intensive	PMRA	158.8 (6-1/4)	235 (9-1/4)	127 (5)	203.2 (8)
Carlisle SynTec Systems Canada	Carlisle Intensive Roof Garden System	Intensive	PMRA	235 (9-1/4)	None Stated	203.2 (8)	None Stated
Hydrotech Membrane Corporation	Hydrotech Extensive Garden Roof Assembly	Extensive	All	101.6 (4)	203.2 (7)	76.2 (3)	152.4 (6)
Hydrotech Membrane Corporation	Hydrotech Semi-Intensive Garden Roof Assembly	Semi-Intensive	PMRA	203.2 (8)	355.6 (14)	152.4 (6)	304.8 (12)
Hydrotech Membrane Corporation	Hydrotech Intensive Garden Roof Assembly	Intensive	PMRA	355.6 (14)	939.8 (37)	304.8 (12)	889 (35)
Next Level Stormwater Management	NLSM LiteN'Less	Extensive	All	40.7 (1-5/8)	64.0 (2-1/2)	25.4 (1)	25.4 (1)
Next Level Stormwater Management	NLSM LiteN'Less II	Extensive	All	30.7 (1-1/8)	30.7 (1-1/8)	20 (13/16)	20 (13/16)
Next Level Stormwater Management	NLSM LiteN'Less III	Extensive	All	45.0 (1-13/16)	62.0 (2-7/16)	20 (13/16)	20 (13/16)
Next Level Stormwater Management	NLSM TerraEXT	Extensive	All	113.0 (4-13/16)	188 (7-13/16)	95.0 (3-3/4)	170 (6-11/16)
Next Level Stormwater Management	NLSM StormCap	Extensive	All	114 (4-1/2)	264 (10-3/8)	70 (2-3/4)	170 (6-11/16)
Next Level Stormwater Management	NLSM StormCap Detain 3°	Extensive	All	114 (4-1/2)	352 (13-7/8)	70 (2-3/4)	170 (6-11/16)
Next Level Stormwater Management	NLSM Eco-Grass	Semi-Intensive	PMRA	188 (7-7/16)	338 (13-5/16)	170 (6-11/16)	320 (12-9/16)
Next Level Stormwater Management	NLSM Flora Garden	Semi-Intensive	PMRA	162 (6-3/8)	312 (12-5/16)	150.4 (6)	304.8 (12)
Soprema Inc.	SOPRANATURE® Extensive-Conv. Veg. Roof	Extensive	All	85.85 (3-3/8)	162 (6-3/8)	76.2 (3)	152.4 (6)
Soprema Inc.	SOPRANATURE® Extensive-Inverted Veg. Roof	Extensive	All	88.1 (3-6/16)	164.3 (6-6/16)	76.3 (3)	152.4 (6)
Soprema Inc.	SOPRANATURE® Modular-Conv. Veg. Roof	Extensive	All	100.5 (3-15/16)	100.5 (3-15/16)	100 (3-7/8)	100 (3-7/8)
Soprema Inc.	SOPRANATURE® Modular-Inverted Veg. Roof	Extensive	All	100.5 (3-15/16)	100.5 (3-15/16)	100 (3-7/8)	100 (3-7/8)
Soprema Inc.	SOPRANATURE® Semi-Intensive-Inverted Veg. Roof	Semi-Intensive	PMRA	164.3 (6-6/16)	316.7 (12-6/16)	152.4 (6)	304.8 (12)
Soprema Inc.	SOPRANATURE® Semi-Intensive-Conventional Veg. Roof**	Semi-Intensive	PMRA**	164.3 (6-6/16)	316.7 (12-6/16)	152.4 (6)	304.8 (12)
Soprema Inc.	SOPRANATURE® Intensive-Inverted Veg. Roof	Intensive	PMRA	361.7 (12-6/16)	361.7 (12-6/16) +	304.8 (12)	304.8 (12) +
Soprema Inc.	SOPRANATURE® Intensive-Conventional Vegetated Roof**	Intensive	PMRA**	361.7 (12-6/16)	361.7 (12-6/16) +	304.8 (12)	304.8 (12) +
Soprema Inc.	SKYWATER® Ballasted-Inverted Hybrid Roof	Hybrid	PMRA	107.9 (4-1/4)	336.5 (13-1/4) +	76.3 (3)	304.8 (12) +
Soprema Inc.	SKYWATER® Ballasted-Conv. Hybrid Roof**	Hybrid	PMRA**	107.9 (4-1/4)	336.5 (13-1/4) +	76.3 (3)	304.8 (12) +
Soprema Inc.	SKYWATER® SOPRAFLOW CONTROL**	Hybrid	PMRA**	136.9 (5-3/8)	265.2 (14-3/8)	76.3 (3)	304.8 (12) +
ZinCo Canada Inc.	ZinCo Sedum Roof	Extensive	All	101.6 (4)	127 (5)	80 (3-1/8)	80 (3-1/8)
ZinCo Canada Inc.	ZinCo Sedum Roof (Inverted)	Extensive	All	101.6 (4)	127 (5)	80 (3-1/8)	80 (3-1/8)
ZinCo Canada Inc.	ZinCo Sedum Roof XL	Extensive	All	114.3 (4-1/2)	152.4 mm (6)	80 (3-1/8)	80 (3-1/8)
ZinCo Canada Inc.	ZinCo Sedum Roof XL (Inverted)	Extensive	All	114.3 (4-1/2)	152.4 mm (6)	80 (3-1/8)	80 (3-1/8)
ZinCo Canada Inc.	ZinCo Semi-Intensive Perennial Garden Assembly (Inverted)	Semi-Intensive	PMRA	185 (7-1/4)	203.2 (8)	152.4 (6)	152.4 (6)
ZinCo Canada Inc.	ZinCo Semi-Intensive Perennial Garden Assembly**	Semi-Intensive	PMRA**	185 (7-1/4)	203.2 (8)	152.4 (6)	152.4 (6)
ZinCo Canada Inc.	ZinCo Roof Garden Assembly (Inverted)	Intensive	PMRA	241.3 (9-1/2)	260.35 (10-1/4)	203.1 (8)	203.1 (8)
ZinCo Canada Inc.	ZinCo Roof Garden Assembly**	Intensive	PMRA**	241.3 (9-1/2)	260.35 (10-1/4)	203.1 (8)	203.1 (8)
ZinCo Canada Inc.	ZinCo Blue Roof Assembly (Inverted)	Hybrid	PMRA	215.9 (8-1/2)	304.8 (12)	101.6 (10)	304.8 (12)
ZinCo Canada Inc.	ZinCo Blue Roof Assembly**	Hybrid	PMRA**	215.9 (8-1/2)	304.8 (12)	101.6 (10)	304.8 (12)
ZinCo Canada Inc.	ZinCo Green Roof & Solar	Extensive	All	203.2 (8)	203.2 (8)	101.6 (4)	101.6 (4)
ZinCo Canada Inc.	ZinCo Green Roof & Solar (Inverted)**	Extensive	PMRA**	203.2 (8)	203.2 (8)	101.6 (4)	101.6 (4)

Screenshot of systems table – RCABC Roofing Practices Manual (RPM)

Risk-managed Green Roofs

The RoofStar Vegetated Roof Guarantee Program

Independent Observations:

- Work with the roofing contractor and installer to achieve success:
  - ☆ 35 Accepted Observer Firms (non-members)
    - ✓ 82+ Observers
    - ✓ RRO (IIBEC) and
    - ✓ GRIMP or RCABC equivalent)
    - ✓ 2-day intensive training by RCABC
  - ☆ Responsible for Quality Assurance
    - ✓ Verify materials & grow media certification; sample growing media after placement; verify qualifications of installers.
    - ✓ Review installation for conformance to the RGC Standard



Photo courtesy of Liz Hart Morris, GreenUp LLC

Risk-managed Green Roofs

The RoofStar Vegetated Roof Guarantee Program

Mandatory Maintenance:

- A green roof is a living system that needs development care and maintenance
- Maintenance Details:
  - ☆ Covers the 2-year Guarantee Period
  - ☆ Paid in advance by the Owner and disbursed by the RGC as maintenance is performed and documented.
  - ☆ A condition of the RoofStar Guarantee.



An unmaintained extensive green roof (Image:RCABC Image Library)

Risk-managed Green Roofs

The RoofStar Vegetated Roof Guarantee Program

- Maintenance details….
  - ☆ Maintained by trained, qualified contractors (RCABC members)
  - ☆ Documented for the RGC and the green roof system manufacturer
  - ☆ Benefits to Owners:
    - ✓ Meets warranty requirements by the system manufacturer
    - ✓ Capitalized expense so it doesn't have to be budgeted as O&M



Main Image: An unmaintained extensive green roof.
Inset: roots penetrate the roof membrane because the root barrier was absent and the roof was unmaintained.
(Photos: RCABC Collection)

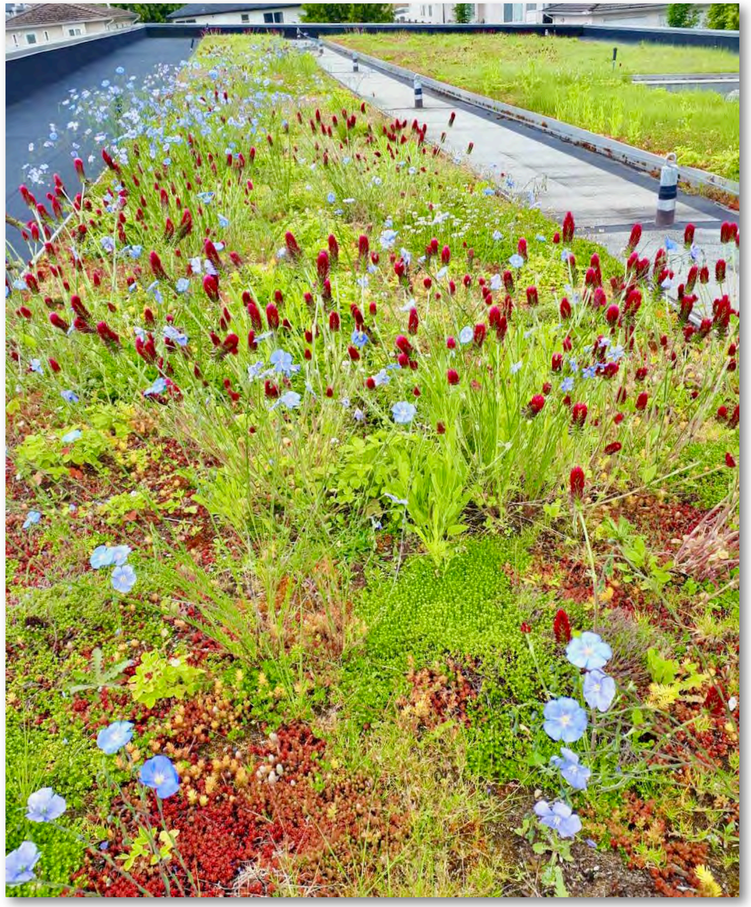
Building Trust

RoofStar
GUARANTEED. BETTER.

Building Trust

We’re in the business of building trust, one green roof at a time.

- We know roofing and green roofs.



City of Burnaby
(Photo: Architek Sustainable Building Products Inc.)

Building Trust

Laying the groundwork for success

- We continue to work with the City of Vancouver to strengthen Vancouver Building By-Law requirements for both.

Vegetated roof assembly ("green roof") means a vegetated roof system (a functional arrangement of interacting components, inclusive of vegetation) that is combined with a roof assembly, is intended to both grow and flourish, and may be installed on a roof to control the rate of rainwater discharged through a *storm drainage system*. (See Note A-1.4.1.1.)

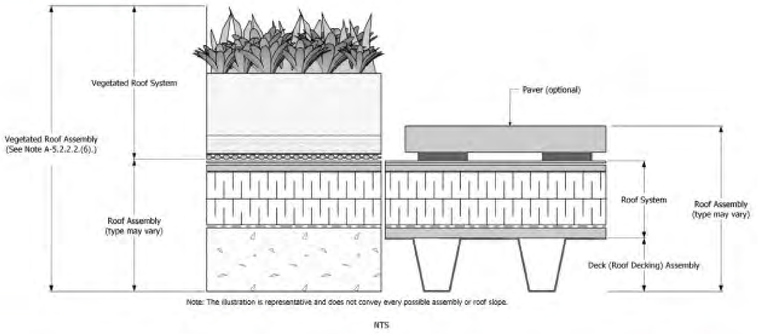
Excerpts from the City of Vancouver Building By-Law (VBBL)

Division A: *Compliance, Objectives and Functional Statements* **Notes to Part 1 –** *Compliance*

A-1.4.1.1. Non-defined Terms

Roof terminology

Where the By-law addresses the separation of environments (Part 5 and Part 9), various terms refer to the assembly on top of a building that protects the building interior from the weather. In gernal terms, that assembly is called a "roof assembly" (or more simply, a "roof") A roof comprises two integrated parts: the "deck assembly" (a structural element of a building, also referred to as the "roof decking assembly"), and the "roof assembly" and not the "roof system"; example, the "roof assembly" must resist wind load (see Article 5.2.2.2. of Divison B).



Note: The illustration is representative and does not convey every possible assembly or roof slope. Not to scale. Image created by Roofing Contractors Association of British Columbia and is reproduced here with its consent.

Figure A-1.4.1.1.

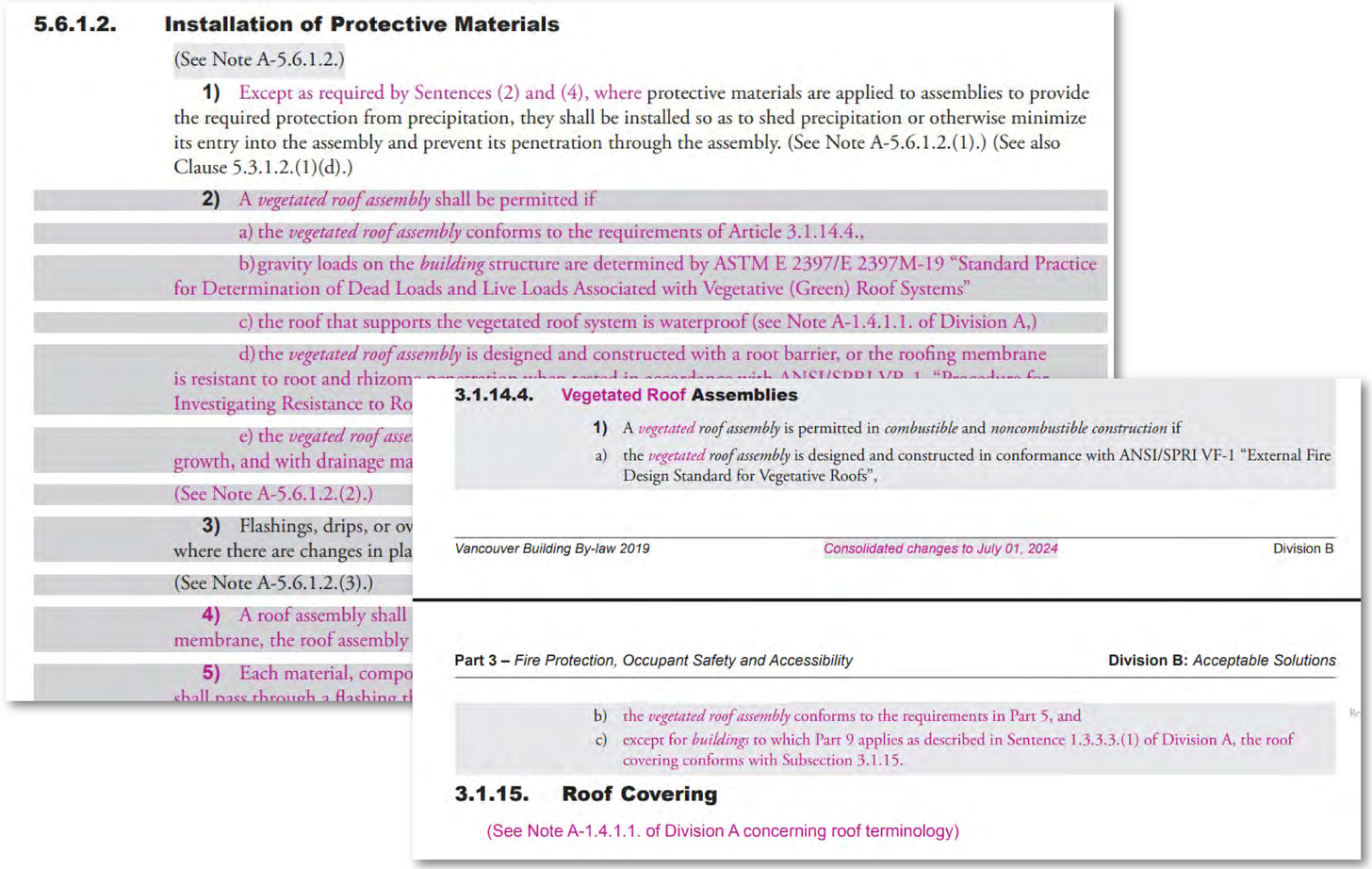
Roof terminology

When materials that seal the roof to resist the transmission of liquid water into a building are constructed on a roof deck — including water under some hydrostatic pressure — they form a waterproofing roof assembly. Waterproofing materials are usually

Building Trust

Laying the groundwork for success

- New requirements in the VBBL, Div. B, including
  - ☆ Article 5.6.1.2.
  - ☆ Article 3.1.14.4.
  - ☆ Subsection 3.1.15.



5.6.1.2. Installation of Protective Materials

(See Note A-5.6.1.2.)

1) Except as required by Sentences (2) and (4), where protective materials are applied to assemblies to provide the required protection from precipitation, they shall be installed so as to shed precipitation or otherwise minimize its entry into the assembly and prevent its penetration through the assembly. (See Note A-5.6.1.2.(1).) (See also Clause 5.3.1.2.(1)(d).)

2) A *vegetated roof assembly* shall be permitted if

a) the *vegetated roof assembly* conforms to the requirements of Article 3.1.14.4.,

b) gravity loads on the *building* structure are determined by ASTM E 2397/E 2397M-19 "Standard Practice for Determination of Dead Loads and Live Loads Associated with Vegetative (Green) Roof Systems"

c) the roof that supports the vegetated roof system is waterproof (see Note A-1.4.1.1. of Division A,)

d) the *vegetated roof assembly* is designed and constructed with a root barrier, or the roofing membrane is resistant to root and rhizom

Investigating Resistance to Ro

e) the *vegated roof asse*

growth, and with drainage ma

(See Note A-5.6.1.2.(2).)

3) Flashings, drips, or ov

where there are changes in pla

(See Note A-5.6.1.2.(3).)

4) A roof assembly shall

membrane, the roof assembly

5) Each material, compo

shall pass through a flashing t

3.1.14.4. Vegetated Roof Assemblies

1) A *vegetated roof assembly* is permitted in *combustible* and *noncombustible construction* if

a) the *vegetated roof assembly* is designed and constructed in conformance with ANSI/SPRI VF-1 "External Fire Design Standard for Vegetative Roofs",

Vancouver Building By-law 2019 *Consolidated changes to July 01, 2024* Division B

Part 3 – *Fire Protection, Occupant Safety and Accessibility* **Division B:** *Acceptable Solutions*

b) the *vegetated roof assembly* conforms to the requirements in Part 5, and

c) except for *buildings* to which Part 9 applies as described in Sentence 1.3.3.3.(1) of Division A, the roof covering conforms with Subsection 3.1.15.

3.1.15. Roof Covering

(See Note A-1.4.1.1. of Division A concerning roof terminology)

Excerpts from the City of Vancouver Building By-Law (VBBL)

Building Trust

Influencing the national scene

- Our Standard for Vegetated Roofs has been selected by the CSA Group as the model standard for a forthcoming CSA national standard for green roofs!



(Photo: RCABC Collection)

Building Trust

Through our commitment to excellence, we intend to change the narrative about green roofs.



(Photo: Architek Sustainable Building Products Inc.)

Building Trust

So that there is a better alternative to this kind of thing…



(Photos: RCABC Image Library)

Building Trust

That looks more like this!



Golden Ears Pump Station, Pitt Meadows, BC (Photo: Architek Sustainable Building Products Inc.)

Q&A

Let’s talk green roofing…





technical@RCABC.org

604-882-9734

9734 – 201 Street
Langley, BC V1M 3E8

RCABC ROOFING CONTRACTORS ASSOCIATION OF BRITISH COLUMBIA

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Building a Greener Future

How the RoofStar Vegetated Roof Guarantee Works

RoofStar
GUARANTEED. BETTER.

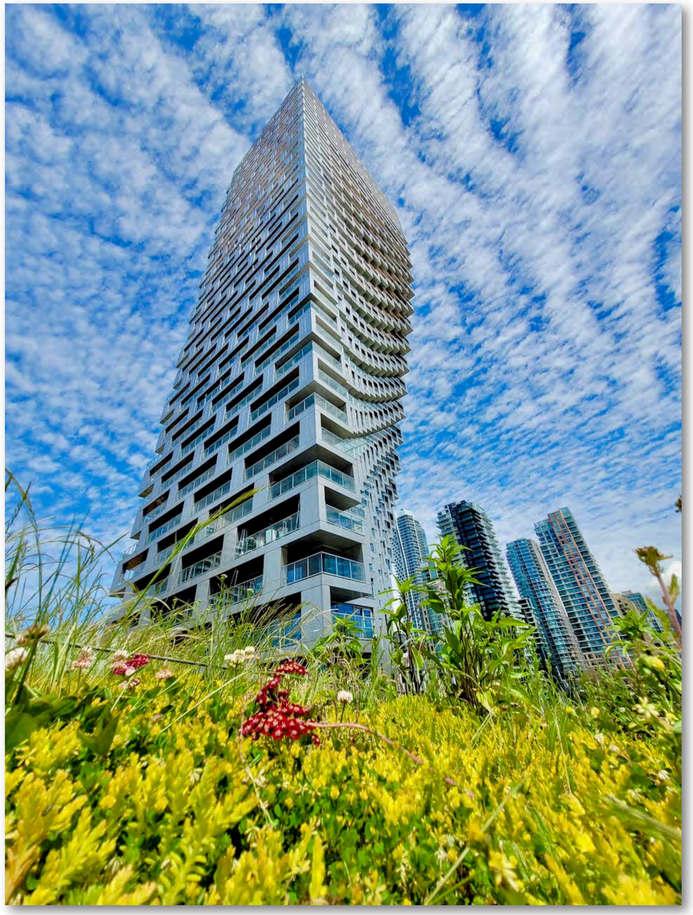
Building a Greener Future

How the RoofStar Vegetated Roof Guarantee Works

- Only RCABC member contractors can bid green roofing for a RoofStar Vegetated Roof Guarantee
- Costs for the Guarantee are minimal (essentially administrative) because we partner with the system manufacturer to deliver their warranty wrapped up in our widely recognized and trusted brand, RoofStar™.
- Every accepted green roof system includes the following:
  - root barrier, drainage layer, and protection layer*;
  - vapour diffusion membrane† and filtration layer;
  - growing media, and
  - vegetation.

* in extensive systems, the drainage layer usually provides this function.

† applies only to some manufacturers



Vancouver House (Photo: Architek Sustainable Building Products Inc.)

Building a Greener Future

How the RoofStar Vegetated Roof Guarantee Works

What our Guarantee covers:

- Like the system manufacturers, we guarantee to arrange repairs of the system if it fails to perform because of poor installation or a failed material.
- When it comes to vegetation, we will arrange to restore no less than 80% surface coverage, only for extensive vegetated roofs when they are pre-grown as mats or in trays.
- Term: two years, but an owner may purchase the system warranty from the manufacturer for a longer term.



Photo: GreenUp LLC

Building a Greener Future

How the RoofStar Vegetated Roof Guarantee Works

- Our program behind each guaranteed green roof combines Quality Control and Quality Assurance like nowhere else:
  - ☆ Reduced owner risk
  - ☆ Thriving vegetated roof
  - ☆ High probability of a leak-free roof
  - ☆ Plenty of room for system/design variability
  - ☆ Guarantee coverage for vegetation (subject to conditions)



A sedum roof without a separation zone (and root barrier), and (inset) resulting root damage to membrane (Photo: RCABC Collection)

Building a Greener Future

How the RoofStar Vegetated Roof Guarantee Works

- 5 VR system manufacturers
- Around 40 systems currently accepted by the RGC
- Two pathways to a Guarantee:
  - ☆ Roof membrane + vegetated roof system (by same manufacturer)
  - ☆ Roof membrane + vegetated roof system (separate manufacturers)
    - ✓ Roof membrane by an RCABC Associate (Manufacturer) member
    - ✓ Vegetated roof system by an RCABC Affiliate Member
    - ✓ Supply and Warranty Agreement between the two parties

Vegetated ("Green") Roof Systems (VRS)

Vegetated Roof Systems

Click on a manufacturer's name to see the full list of their vegetated roof systems accepted for use in the RoofStar Guarantee Program. Click on the System Name to see the materials and documentation for the system.
To reset this page to its original view, click your browser refresh button.

VRS Supplier	VR System Name *	VRS Type †	Permissible Roof Assembly†	System Min. Depth mm (in) ‡	System Max. Depth mm (in)	Media Min. Depth mm (in) ‡	Media Max. Depth mm (in)
Carlisle SynTec Systems Canada	Carlisle Extensive Roof Garden System	Extensive	All	101.6 (4)	158.8 (6-1/4)	70 (1-1/4)	127 (5)
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Carlisle SynTec Systems Canada	Carlisle Semi-Intensive Roof Garden System	Semi-Intensive	PMRA	158.8 (6-1/4)	235 (9-1/4)	127 (5)	203.2 (8)
Carlisle SynTec Systems Canada	Carlisle Intensive Roof Garden System	Intensive	PMRA	235 (9-1/4)	None Stated	203.2 (8)	None Stated
Hydrotech Membrane Corporation	Hydrotech Extensive Garden Roof Assembly	Extensive	All	101.6 (4)	203.2 (7)	76.2 (3)	152.4 (6)
Hydrotech Membrane Corporation	Hydrotech Semi-Intensive Garden Roof Assembly	Semi-Intensive	PMRA	203.2 (8)	355.6 (14)	152.4 (6)	304.8 (12)
Hydrotech Membrane Corporation	Hydrotech Intensive Garden Roof Assembly	Intensive	PMRA	355.6 (14)	939.8 (37)	304.8 (12)	889 (35)
Next Level Stormwater Management	NLSM LiteN'Less	Extensive	All	40.7 (1-5/8)	64.0 (2-1/2)	25.4 (1)	25.4 (1)
Next Level Stormwater Management	NLSM LiteN'Less II	Extensive	All	30.7 (1-1/8)	30.7 (1-1/8)	20 (13/16)	20 (13/16)
Next Level Stormwater Management	NLSM LiteN'Less III	Extensive	All	45.0 (1-13/16)	62.0 (2-7/16)	20 (13/16)	20 (13/16)
Next Level Stormwater Management	NLSM TerraEXT	Extensive	All	113.0 (4-13/16)	188 (7-13/16)	95.0 (3-3/4)	170 (6-11/16)
Next Level Stormwater Management	NLSM StormCap	Extensive	All	114 (4-1/2)	264 (10-3/8)	70 (2-3/4)	170 (6-11/16)
Next Level Stormwater Management	NLSM StormCap Detain 3"	Extensive	All	114 (4-1/2)	352 (13-7/8)	70 (2-3/4)	170 (6-11/16)
Next Level Stormwater Management	NLSM Eco-Grass	Semi-Intensive	PMRA	188 (7-7/16)	338 (13-5/16)	170 (6-11/16)	320 (12-9/16)
Next Level Stormwater Management	NLSM Flora Garden	Semi-Intensive	PMRA	162 (6-3/8)	312 (12-5/16)	150.4 (6)	304.8 (12)
Soprema Inc.	SOPRANATURE® Extensive-Conv. Veg. Roof	Extensive	All	85.85 (3-3/8)	162 (6-3/8)	76.2 (3)	152.4 (6)
Soprema Inc.	SOPRANATURE® Extensive-Inverted Veg. Roof	Extensive	All	88.1 (3-6/16)	164.3 (6-6/16)	76.3 (3)	152.4 (6)
Soprema Inc.	SOPRANATURE® Modular-Conv. Veg. Roof	Extensive	All	100.5 (3-15/16)	100.5 (3-15/16)	100 (3-7/8)	100 (3-7/8)
Soprema Inc.	SOPRANATURE® Modular-Inverted Veg. Roof	Extensive	All	100.5 (3-15/16)	100.5 (3-15/16)	100 (3-7/8)	100 (3-7/8)
Soprema Inc.	SOPRANATURE® Semi-Intensive-Inverted Veg. Roof	Semi-Intensive	PMRA	164.3 (6-6/16)	316.7 (12-6/16)	152.4 (6)	304.8 (12)
Soprema Inc.	SOPRANATURE® Semi-Intensive-Conventional Veg. Roof**	Semi-Intensive	PMRA**	164.3 (6-6/16)	316.7 (12-6/16)	152.4 (6)	304.8 (12)
Soprema Inc.	SOPRANATURE® Intensive-Inverted Veg. Roof	Intensive	PMRA	361.7 (12-6/16)	361.7 (12-6/16) +	304.8 (12)	304.8 (12) +
Soprema Inc.	SOPRANATURE® Intensive-Conventional Vegetated Roof**	Intensive	PMRA**	361.7 (12-6/16)	361.7 (12-6/16) +	304.8 (12)	304.8 (12) +
Soprema Inc.	SKYWATER® Ballasted-Inverted Hybrid Roof	Hybrid	PMRA	107.9 (4-1/4)	336.5 (13-1/4) +	76.3 (3)	304.8 (12) +
Soprema Inc.	SKYWATER® Ballasted-Conv. Hybrid Roof**	Hybrid	PMRA**	107.9 (4-1/4)	336.5 (13-1/4) +	76.3 (3)	304.8 (12) +
Soprema Inc.	SKYWATER® SOPRAFLOW CONTROL**	Hybrid	PMRA**	136.9 (5-3/8)	265.2 (14-3/8)	76.3 (3)	304.8 (12) +
ZinCo Canada Inc.	ZinCo Sedum Roof	Extensive	All	101.6 (4)	127 (5)	80 (3-1/8)	80 (3-1/8)
ZinCo Canada Inc.	ZinCo Sedum Roof (Inverted)	Extensive	All	101.6 (4)	127 (5)	80 (3-1/8)	80 (3-1/8)
ZinCo Canada Inc.	ZinCo Sedum Roof XL	Extensive	All	114.3 (4-1/2)	152.4 mm (6)	80 (3-1/8)	80 (3-1/8)
ZinCo Canada Inc.	ZinCo Sedum Roof XL (Inverted)	Extensive	All	114.3 (4-1/2)	152.4 mm (6)	80 (3-1/8)	80 (3-1/8)
ZinCo Canada Inc.	ZinCo Semi-Intensive Perennial Garden Assembly (Inverted)	Semi-Intensive	PMRA	185 (7-1/4)	203.2 (8)	152.4 (6)	152.4 (6)
ZinCo Canada Inc.	ZinCo Semi-Intensive Perennial Garden Assembly**	Semi-Intensive	PMRA**	185 (7-1/4)	203.2 (8)	152.4 (6)	152.4 (6)
ZinCo Canada Inc.	ZinCo Roof Garden Assembly (Inverted)	Intensive	PMRA	241.3 (9-1/2)	260.35 (10-1/4)	203.1 (8)	203.1 (8)
ZinCo Canada Inc.	ZinCo Roof Garden Assembly**	Intensive	PMRA**	241.3 (9-1/2)	260.35 (10-1/4)	203.1 (8)	203.1 (8)
ZinCo Canada Inc.	ZinCo Blue Roof Assembly (Inverted)	Hybrid	PMRA	215.9 (8-1/2)	304.8 (12)	101.6 (10)	304.8 (12)
ZinCo Canada Inc.	ZinCo Blue Roof Assembly**	Hybrid	PMRA**	215.9 (8-1/2)	304.8 (12)	101.6 (10)	304.8 (12)
ZinCo Canada Inc.	ZinCo Green Roof & Solar	Extensive	All	203.2 (8)	203.2 (8)	101.6 (4)	101.6 (4)
ZinCo Canada Inc.	ZinCo Green Roof & Solar (Inverted)**	Extensive	PMRA**	203.2 (8)	203.2 (8)	101.6 (4)	101.6 (4)

Screenshot of systems table – RCABC Roofing Practices Manual (RPM)

Building a Greener Future

How the RoofStar Vegetated Roof Guarantee Works

Programmed to work:

- Uses common system types with clear definitions.
- Limitations on system choices, while making room for creative designs, reduces the risk of failure and promotes insurability.
- Built-in development maintenance and care requirements, including a downloadable maintenance report form acceptable to all suppliers (Appendix A)

Table A-1.1.3.2.
Characteristics of Vegetated Roof Systems, by Type
Forming Part of Note A-1.1.3.2.

Characteristics	Extensive	Semi-Intensive	Intensive
FLL Category	Extensive greening	Semi-Intensive greening	Intensive greening
Vegetation support depth*	152.4 mm (6") to 203.2 mm (8")	152.4 mm (6") to 355.6 mm (14")	Greater than 355.6 mm (14")
Accessibility	Often inaccessible except for maintenance	May be partially accessible	Usually accessible (public or private)
Fully saturated weight (typical ranges†)	Low 48.8 – 170.9 Kg/m^2 (10-35 lb/sf)	Moderate 170.9 – 244.1 Kg/m^2 (35 – 50 lb/sf)	High 170.9 – 1464.7 Kg/m^2 (36 – 300 lb/sf)
Plant diversity††	Low	Greater	Greatest
Cost	Low	Generally mid-range	Higher
Maintenance**	Minimal	Variable, depending on vegetation selection	Generally high

An example of a table for Vegetated Roof System Types (From the Notes to the Standard for Vegetated Roofs)

For more about what defines each system type, refer to Article 1.1.1.4., Defined Terms, and see Note A-1.1.3.2., Permitted Vegetated Roof Systems.

Building a Greener Future

How the RoofStar Vegetated Roof Guarantee Works

If you're a designer and want what we offer,

- Remember that the RoofStar Guarantee for Vegetated Roofs is available only as a partner guarantee with a new RoofStar Guarantee for the roof.
  - This ensures the green roof has a long, successful future ahead, because it will be supported by new roofing materials properly secured to resist anticipated loads (including wind).

RoofStar

GUARANTEED. BETTER.

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How the RoofStar Vegetated Roof Guarantee Works

- Specify the RoofStar Vegetated Roof Guarantee (see the RPM for sample language)
- Specify the green roofing as part of the roofing scope (Div. 07), not as landscaping.



Vancouver Public Library (Photo: Hydrotech Corporation)

Building a Greener Future

How the RoofStar Vegetated Roof Guarantee Works

- Pay attention to the RGC Guarantee design requirements in the published Standard, to ensure the supporting roof design and the green roof system conform. Remember,…
  - **Extensive** vegetated roofs can be designed for any type of supporting membrane roof assembly, but
  - **Semi-intensive** and **intensive** vegetated roofs are permissible only on a protected membrane roof.

    (Sentence 1.1.3.2.(5))



St. Philips Academy, Newark, NJ
(Photo: credit unknown)

Building a Greener Future

How the RoofStar Vegetated Roof Guarantee Works

- Wind and other loads:
  - Every bidder will need to know the Specified Wind Loads for the principal roof zones (Corners, Edges, and Field).
  - Include those load values on the structural drawings of the roof plan, as they form part of the requirements for securing the green roof system and the manufacturer can provide tested system data to the bidder. (Sentence 3.1.3.2.(1))
  - Also be mindful of anticipated mass for mature plants – that cute 50-lb sapling may be 12,000 lbs at age 20!



(Photo: Down to Earth Trees Ltd., Essex, UK)

Building a Greener Future

How the RoofStar Vegetated Roof Guarantee Works

- Remember that the RoofStar Guarantee for Vegetated Roofs is systems-based:
  - We guarantee green roof systems, and we won't permit an *à la carte* approach to building a green roof.
  - By using Accepted Systems, we control the quality for the sake of the owner. And it ensures manufacturers will stand behind every component of their systems.



Thriving sedum mats on the training roof installation at RCABC, Langley
(Photo: RCABC Collection)

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How the RoofStar Vegetated Roof Guarantee Works

- Specify what you want (Article 1.1.3.2.):
  - ☆ Option A: The actual system(s) you prefer (pulled from the systems table in the RPM) – this option gives the designer more control over outcomes
  - ☆ Option B: The type of system(s) you prefer (i.e., extensive, intensive) – this option transfers more control over outcomes to the bidder
- Consult system manufacturer for performance characteristics (saturated weight, rainwater detention, wind resistance)



Trays and mats on the training roof installation at RCABC, Langley (Photo: RCABC Collection)

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How the RoofStar Vegetated Roof Guarantee Works

- Water Supply & Irrigation:
  - Most new green roofs require water during establishment, so a supply of water to the roof is a mandatory part of the design (Article 8.1.3.1.)



Photo courtesy of Liz Hart Morris, GreenUp LLC

Building a Greener Future

How the RoofStar Vegetated Roof Guarantee Works

What about designing for biodiversity? Beauty?

- Think of our program as a great garden with **lots of space for everyone** – those who need things simple, those who want to advance ecological diversity and restoration, and those who's primary goal is beauty:
  - Biodiversity is not mandated in our Standard, but it is recognized and supported through our maintenance requirements (Article 11.1.3.1.)
  - At the same time, we want to ensure that people can be confident about green roofs
  - We want green roofs to be approachable for those who are curious, and we foster space for those who promote creative, complex, and beautiful designs.



Van Dusen Gardens admin building
(Photo: Architek Sustainable Building Products Inc.)

Building a Greener Future

How the RoofStar Vegetated Roof Guarantee Works

What about extending the RoofStar Vegetated Roof Guarantee & maintenance?

- For now, our RoofStar Vegetated Roof Guarantee is for two years (in years to come, we may offer a longer term), but the system manufacturer offers warranties that can extend beyond that.
- As for maintenance, an owner is welcome and encouraged to purchase a maintenance extension from the service provider.



(Photo: RCABC Image Library