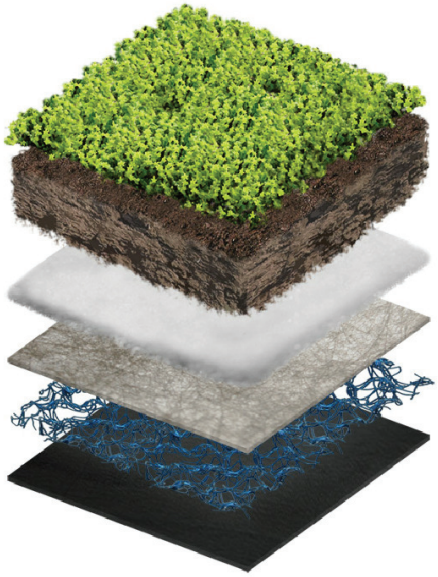
COLUMBIA GREEN

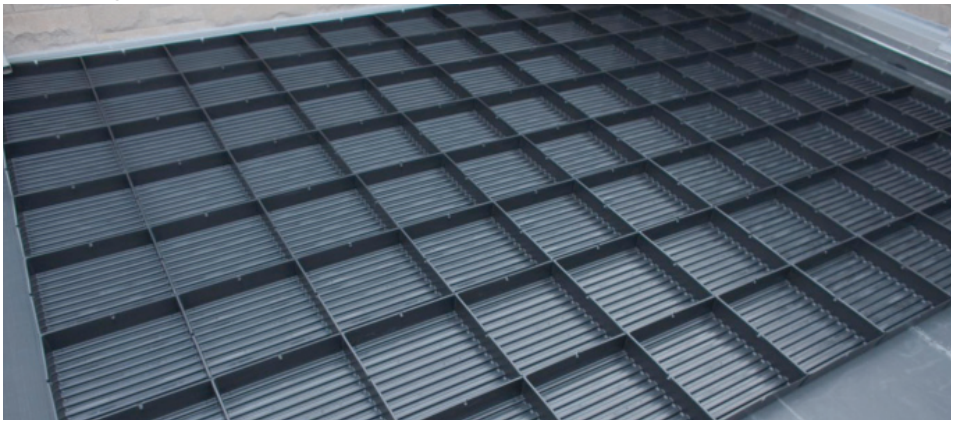
AVRS®

Tray System

Mulitlayer System



Interlocking Tray System



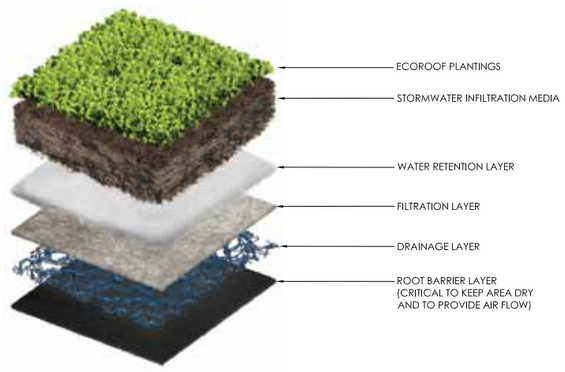
Mulitlayer System

AVRS®

Advanced Vegetative Roof Systems

The New Standard In Eco-roof Technology

The difference in a sustainable global environment is the difference in contributing technologies!



AVRS® Multilayer System *(patent pending)*

Features and benefits of the AVRS® Multilayer system:

- Used as a stormwater management Best Management Practice (BMP) for Low Impact Development (LID) applications. Detains peak flows to reduce stream erosion or combined sewer overflows (CSOs) Also, retains stormwater for evapotranspiration to reduce the runoff volume.
- The water retention layer provides for mechanical anchoring of plants roots, moisture retention for plant available water, and high porosity to allow root areation
- Allow hydration of plants, prevent root rot, allow airflow under and up through the multilayer system
- Allow phyto-remediation (removal of contaminates) from the soil
- Protect the roots with a root barrier under the system and above the waterproof membrane
- Allows growing medium of greater than 6" in depth
- Consists of multiple layers for optimum plant health

An **extensive** eco roof is designed to provide maximum groundcover, water retention, erosion resistance, and evapo-transpiration of moisture. Extensive green roofs usually use plants with foliage from 2 to 18 inches and from 2 to 6 inches of growing media.

An **intensive** green roof is intended to be more of a natural landscape. Intensive green roofs may use plants with foliage from 1 to 6 feet and may require several inches or feet of growing media depth. This planting option is well-suited for large roofs that require expansive coverage. Intensive planting options allow for monolithic coverage over the entire roof, and can be installed easily around curved area, low-slope and other custom shapes.

AVRS® Tray System *(patented: 7,603,808)*

Urban development throughout the world results in the increase of impervous surfaces, which increase storm water runoff, decreases infiltration and evapotranspiration. In addition, pollutants deposited on these surfaces are transported into our surface waters, degrading water quality and the natural habitat.

For both new construction and retrofitting, the green roof products provided by Columbia Green were developed by roofers and environmental engineers to meet stringent roofing requirements while providing a high degree of environmental benefits.

Our turn key solutions meet or exceed all guidelines for Green-Roofs. The systems are easy to install, many times 30% faster than other systems. Along with easy, low cost maintnenace, the AVRS system are the markets best choice.

Columbia Green's AVRS Tray system meets or exceeds all guidelines for Green-Roofs. The Tray system is durable, secure, easy to install and maintain. This system can be installed 30% faster and with fewer staff than most multilayered systems. The markets best choice – delivering a high quality lower cost of ownership.

"This is the fifth garden roof Westech has been involved with. This is the first one we have had the whole system (waterproofing, irrigation,soil, plants and maintenance) I have casually monitored all projects and can honestly say this is the only one thriving. The Columbia Green tray system was the key to success with this installation."

- Larry Hunt, President

Features and benefits of the AVRS® Tray system:

- Used as a stormwater management Best Management Practice (BMP) for Low Impact Development (LID) applications. Detains peak flows to reduce stream erosion or combined sewer overflows (CSOs) Also, retains stormwater for evapotranspiration to reduce the runoff volume.
- Acts as a thermal blanket to the building's roof, making solar, heating and air conditioners more efficient, resulting in as much as 20% energy costs savings.
- Shades the roof and helps decrease ambient air temperature reducing the overall heat island effect in cities.
- Designed to encourage proper bio and phyto-remediation of stormwater and air pollutants.
- City noises are attenuated by the aggregate addition of AVRS Tray systems throughout a city.
- Protects the roof from UV radiation, freeze-thaw cycling, heat stress, wind damage, and temperature fluctuations. This reduces maintenance costs while extended the life of the roof (2.5 times is achievable), increasing property value.
- Enhances the visual experience of medical, hospitality, and recreation facility clients, employees, and visitors.

All of these items and more contribute from 6 to 14 LEED points for sustainable building structures.

Technological Benefits of Green Roof Tray and Multilayer Systems

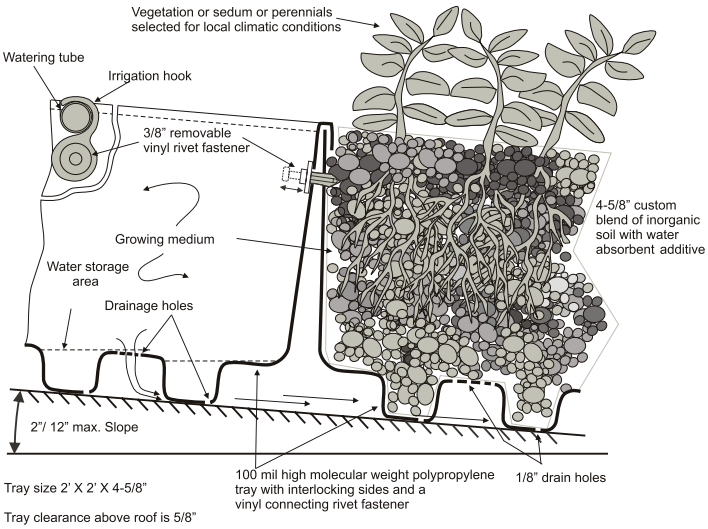
This comparison is based on general features of type of technology and not specific to any one technology as there are, in many cases, substantial differences within each technology. This comparison is not intended to demonstrate the one technology is better than the other, rather to demonstrate that each one has advantages over the other and should be used where appropriate. In fact, in many case combinations of trays and multilayer system provide the best solution.

	Stormwater Management		Design					Installation			Features		Maintenance	
Product	Retention	Detention	Min height	Max height	Min weight	Shaping	Anchoring	Tiles	Cuttings	Plugs	Irrigation	Trim	Routine	Repairs
AVRS® Tray	√ √ √	√ √ √	√ √	√ √ √ √	√ √	√	√ √ √	√	√ √ √	√ √ √	√ √ √	√ √ √	√ √ √	√ √ √
Multilayer High Profile	√ √	√ √	√ √ √	√ √ √	√ √	√ √	√ √	√	√ √ √	√	√	√	√ √ √	√
Multilayer Low Profile	√	√	√ √ √ √	√ √	√ √ √	√ √	√ √	√	√ √ √	√	√	√	√ √	√ √
Hybrid	√ √ √ √	√ √ √ √	√ √	√ √ √	√ √	√ √ √	√ √	√	√ √ √	√ √	√ √ √	√ √	√ √	√ √

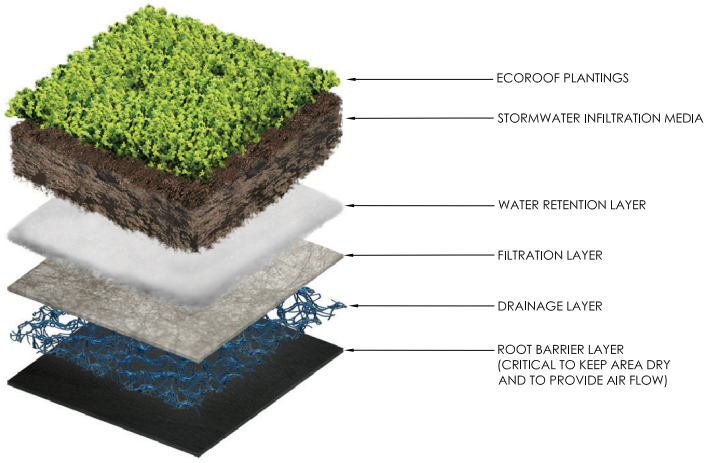
√ = fine, √ √ = good, √ √ √ = better, √ √ √ √ = best

Inside the AVRS Solution

AVRS®
Advanced Vegetative Roof Systems



Tray System Details



Multilayer System Details

Quality Assurance

The AVRS® solution is only installed by Columbia Green-approved and certified contractors. AVRS is to be installed over high-quality roof membrane systems. The roof systems must be inspected and approved by the membrane manufacturer prior to installation. Based on regionally-specific engineered growing medium, the AVRS Tray and/or Mulitlayer weight may be 12-26 lbs per square foot Field Moisture Capacity (FMC). As a result, the owner is responsible for determining the structural weight capacity of the building and roof structure prior to installing AVRS.

Scope

Columbia Green Advanced Vegetative Roof Systems (AVRS) are designed to be a turn-key solution that is easily installed and maintained. These patent pending systems are designed to provide a green roof solution which will integrate with multiple roofing materials and deliver long-term, economical performance. Columbia Green will provide all materials to complete a successful installation of the AVRS Green Roof System.

The systems include:

AVRS Trays

- AVRS Trays are manufactured from 100% recycled, 100 mil high molecular weight polypropylene. Each tray utilizes an engineered, overlapping edge and removable vinyl rivets to securely join the trays – creating an integrated system.

AVRS Multilayer

- AVRS mulitlayers consist of: Geosynthetic Water Retention Layer, Filter Layer, Drainage Layer and Root Barrier Layer

Growth media – soil (both trays and multilayer)

- The growth media consists of a regionally-specific, engineered, light-weight blend of inorganic and organic components.

Plants (both trays and multilayer)

- AVRS utilizes a wide variety of weather resistant succulents to ensure healthy, attractive growth with low maintenance. USDA hardiness zone classifications will be recommended for each installation.

COLUMBIA GREEN

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