



Charlie Miller, P.E., Principal

7135 Germantown Avenue, Second Floor
Philadelphia, PA 19119

P 215-247-8784

F 215-247-4659

cmiller@roofmeadow.com

www.roofmeadow.com

ROOF MEDIA SELECTION

Charlie Miller, P.E.

The choice of green roof planting media depends on many factors. This memorandum is concerned only with veneer landscapes, and not projects which are based on isolated planters. Veneer landscapes can range in depth from a couple of inches (so called 'extensive' vegetated covers) to several feet ('intensive' roof landscapes). However, the principals of design are the same, regardless of depth.

Using veneer landscapes, it is generally possible to support larger plants using shallower depths of planting media than would otherwise be possible. This is due to three factors:

1. **The roots of plants can extend horizontally** over large areas. This increases access to moisture and nutrients.
2. Containerized plants often suffer from temperature shock (hot or cold) due to the large surface areas of the container, as compared to its volume. Veneer landscapes have a **lower surface area**.
3. **Moisture conditions change more gradually**, due to the lateral continuity of the media

The design of veneer landscapes incorporates multiple layers. With few exceptions the layers are arranged so that the particle size increases with depth. **This mimics many natural systems**, where surface layers of topsoil, rich in loam and organic matter, overlie sandy 'subsoil', and eventually a foundation of fractured rock or shale. As in nature, we want the plants to send their roots into the deepest zone (i.e., the bedrock) where moisture and temperature conditions will be most stable. Therefore, irrigation, when required, is introduced in the deepest layer.

Few green roofs have more than three layers. Most have two layers. The uppermost layer should be very effective in absorbing and holding on to moisture derived from rainfall and dew. The underlying well-drained media will generally have a lower moisture storage capacity. However, its high surface area

will help stabilize humidity in the system. To reduce weight it is also common to replace the granular drainage layer with a synthetic drain sheet (e.g., Meadowflor™ by Roofmeadow). However, it always advisable to use a granular drainage layer when possible.

Five types of media are most commonly encountered. These are:

1. Drainage media (i.e., base layer)	D	(e.g., Roofmeadow® A)
2. Single-layer extensive media	SE	(e.g., Roofmeadow® M2)
3. Two-layer extensive media	DE	(e.g., Roofmeadow® M3)
4. Intensive media	I	(e.g., Roofmeadow® M4)
5. Turf media	T	

There are of course media with intermediate characteristics, like ‘semi-intensive’ media which share attributes of the two-layer extensive and intensive media.

Key attributes of the various media include:

- Grain-size distribution (generally, clay is a negligible ingredient in all media formulations)
- Moisture content at maximum water capacity
- Moisture content at ‘field capacity’ (i.e., a measure of water retention capability during dry periods)
- Void ratio (air content) at maximum water capacity (about 20% for most media)
- Volatile fraction (i.e., a measure of organic content)
- Maximum salinity
- Total Nitrogen

Detailed guidelines for the appropriate ranges for these attributes have been developed in Europe, most notably by the FLL.¹ Roofscapes, Inc. bases its recommendations on the FLL guidelines. There are many ways to prepare formulations that meet these criteria. However, depending on the ingredients used, the weight and appearance of the media may vary greatly. From a **qualitative** standpoint, the various media types are characterized in Table 1.

¹ Forschungsgesellschaft Landschaftsentwicklung Landschaftsbau e.V. <www.fll.de>

	Typical Grain-Size Distribution	Max. Water Content	Moisture at Field Capacity	Volatile Fraction
D	Coarse Gravel	Low	Low	NA
SE	Gravelly Texture	Moderate	Moderate	Less than 10%
DE	Course to Fine Mixture (silt less than 15%)	Moderate to High	High	Less than 8%
I	Sandy Texture (silt less than 20%)	High	High	Less than 12%
T	Sandy Texture (silt less than 10%)	Moderate to High	Moderate	Less than 3%

Table 1. General Media Characteristics

When it comes to selecting the appropriate type of media, the following may be useful:

1. Media SE

- a. Areas with drainage paths (longest travel path for a drop of water to travel before it reaches a drain) of 15 feet, or less
- b. Sedum groundcovers
- c. Typical media depth of 2-3 inches

2. Media DE

- a. Installed in combination with synthetic drain sheet or, preferably, granular drainage layer (D). Minimum thickness of granular drainage layer should be 2 inches.
- b. Sedum groundcovers, flowering perennials, sedges
- c. Typical media depth of 3-4 inches (Total profile of 5-6 inches)

3. Media I

- a. Installed in combination with granular drainage layer (D). Minimum thickness of drainage layer should be 4 inches.
- b. Sedum groundcovers, low shrubs and herbs, ornamental grasses, flowering perennials, small trees (min. depth for trees is 18 inches)

- c. Typical media depth 6-24 inches (Total profile of 10-36 inches)
- d. (Note: Deeper profiles may include a third intermediate layer with a slightly coarser grain-size distribution than the intensive, I, media).

4. Media T

- a. Installed in combination with granular drainage layer (D). Minimum thickness of drainage layer should be 4 inches.
- b. Turf grasses
- c. Trickle irrigation system required
- d. Typical media depth 6 inches (Total profile depth 10 to 12 inches)

Roofmeadow provides custom formulated media for its Roofmeadow family of green roof systems. We do not sell these materials independently of complete installations.

For more on the specification of media, contact cmiller@roofmeadow.com at Roofmeadow.