INSTRUCTIONS OF GREEN ROOF SYSTEMS INSTALLATION

1. Introduction

Green roofs (GRs) are one of the innovative architectural and urban development options based on sustainable development concepts that can increase urban green areas, improve environmental quality, and generate sustainable urban development. Additionally, Green roofs also improve building insulation and reduce cooling costs. Green roofs are classified into extensive, intense, and semi-intensive active plant layers.

2. Installation instructions

2.1. Installation and evaluation steps for the GRs

2.2. Surveying the location of installation

Surveying and selecting the placement of the green roof is a very important step in the installation process. GRs have been widely employed in apartments, households, schools, etc. So, characteristics of the buildings such as structure, height, area, permeability of roofing materials, and wastewater drainage system are considered for selecting the location.

2.3. Plant species selection

Plants cover the surface of the media and create a green space. The root system may help physical filtration, avoid clogging, absorb nutrients and metals, and serve as media for microorganisms that are attached to it. So, plant species suitable for green roofs should have the following characteristics: easy to grow, thrives in harsh conditions (rain/storm in winter and high temperature in summer), capable of treating wastewater, have a long life, and good coverage.

2.4. Selection of materials

Materials of the layers that support plant growth are considered one of the most important design parameters due to their strong impact on the performance of GRs in terms of vegetation, physical and biochemical processes, hydrodynamics, wastewater treatment, and other functions. Porous media act as adsorbents of pollutants and provide an environment for macrophytes to grow. Materials applied in GRs must have high-performance (e.g., lighter, high absorption capacity and long life).
3. Installation instructions of GRs
3.1. Design parameters

4. Operation and maintenance
The domestic wastewater is collected and transferred to an influent tank before being pumped into GRs through water pipes. Plants use nutrients present in the wastewater to grow. Besides, regular maintenance will increase the lifespan of the roofing materials, limit the leakage, and improve the performance of GRs.

When plants have matured (two months after planting), pruning and harvesting of pruned biomass are carried out. No need to replace new plants unless the plants are not growing well.

5. Caring for the plants and harvesting biomass
To ensure the optimal growth of plants on GRs and maintain their aesthetic appeal, regular care and periodic pruning are necessary. Weeds should be cleared bi-monthly from the systems to promote plant growth. Dead plants should be replaced with new ones. Additionally, during pruning and harvesting care must be taken to avoid damaging the plant root system.

6. Positive impacts of GRs
- Create landscape and provide domestic wastewater treatment
- Provide habitats for local wildlife (Biodiversity)
- Stakeholders involvement

Xuan-Thanh Bui (PI), Thi-Kim-Quyen Vo, Cong-Sac Tran
VNU-HCM Key Laboratory of Advanced Waste Treatment Technology- Ho Chi Minh City University of Technology (HCMUT)
Email: bxthanh@hcmut.edu.vn