Green roofs, also known as "living roofs" or "rooftop gardens," consist of a thin layer of vegetation and growing medium installed on top of a conventional flat or sloped roof. Green roofs are touted for their benefits to cities, as they improve energy efficiency, reduce urban heat island effects, and create green space for passive recreation or aesthetic enjoyment. They are also attractive for their water quality, water balance, and peak flow control benefits. The green roof substrate, like a lawn or meadow, is easy to maintain with a regular application of nutrients (e.g. fertilizer) and water. Rainwater is stored in the growing medium and later released at a controlled rate to minimize the peak flow of runoff into the stormwater system. The growing medium helps to reduce the effect of runoff on the storm sewers, reduces the load on the urban drainage system, and contributes to the local aesthetics of the area.

**Design Guidance:**

- **Green Roof Layers:**
  - **Vegetation:** Plants with appropriate tolerance for harsh rooftop conditions and shallow rooting depths.
  - **Growing Medium:** A drainage layer that consists of a porous medium capable of water storage for plant uptake.
  - **Structural Support:** An experienced professional green roof installer must work with the construction contractor to ensure that the protective membrane installed is appropriate for use under a green roof assembly. The protective membrane should be constructed in sections for easier inspection and maintenance access to the membrane. Green roofs. Green roofs can be purchased as complete green roof systems, with suppliers who distribute all the assembly components, including the waterproofing membrane. Alternatively, a green roof designer can design a custom green roof and specify suppliers for each component of the system.

**Specifications:**

- **Common Concerns:**
  - **Water Damage to Roof:** While failure of waterproofing materials may present a risk of water damage, a common concern is the potential for the growing medium to exceed the load-bearing capacity of the roof structure. The load bearing capacity of the roof structure must be sufficient to support the weight of the soil and plants of the green roof assembly, as well as the live load associated with maintenance staff accessing the roof. A green roof assembly weighing more than 80 kg per square meter when saturated, requires consultation with a structural engineer. Green roofs may be installed on roofs with slopes up to 19%. As a fire resistance measure, non-vegetative materials, such as rocks or pebbles, should be installed around all roof openings and at the base of all walls that contain openings.

**CONSTRUCTION CONSIDERATIONS:**

- **Green roof installation:**
  - **Green roof installation is typically great to ensure that the roof structure is capable of carrying the additional weight that is imposed by the green roof assembly. The roof structure must be designed to support the weight of the green roof assembly.**

**Operation & Maintenance:**

- **Maintenance:**
  - **Water retention:** A green roof system should be equipped with appropriate water retention and run-off systems. Water retention systems include rainwater harvesting and retention systems, which allow the water to be captured and stored for later use. Run-off systems include stormwater drainage systems, which allow excess water to be drained away. The design of the green roof system should be reviewed with the local utilities to ensure compliance with any applicable regulations. The green roof system should also be designed to comply with local stormwater management requirements.

**Cost:**

- **Green Roof Installation Cost:**
  - **Green roof installation cost:** The installation cost of a green roof system can vary depending on the size of the roof, the type of vegetation used, and the complexity of the system. A green roof system typically costs between $5 and $15 per square foot to install, depending on the size of the roof. The installation cost of a green roof system is typically greater than the cost of conventional roofing, but the cost savings can be offset by the long-term benefits of a green roof system, such as reduced energy costs, improved air quality, and increased property values.

**Application:**

- **Green Roof Applications:**
  - **Green roofs are ideal:** Green roofs are ideal for applications that require a low-cost, low-maintenance solution. They are also ideal for applications that require a low-impact, low-maintenance solution. They are also ideal for applications that require a low-impact, low-maintenance solution.

**Vegetation Maintenance:**

- **Vegetation:**
  - **Vegetation:** The growth of vegetation is necessary to ensure that the green roof system is effective. Vegetation should be allowed to mature before the roof is commissioned. Vegetation should be kept free of weeds, and any excess vegetation should be removed. Vegetation should be allowed to mature before the roof is commissioned. Vegetation should be kept free of weeds, and any excess vegetation should be removed. Vegetation should be allowed to mature before the roof is commissioned. Vegetation should be kept free of weeds, and any excess vegetation should be removed.