Certificate in Stormwater Management and Drainage Design

Green Infrastructure and Low Impact Development

Green Infrastructure (GI) and Low Impact Development (LID) are two concepts that are increasingly being used in the field of stormwater management and drainage design. These approaches prioritize the use of natural systems and practices to manage stormwater runoff, rather than relying solely on traditional grey infrastructure solutions like pipes and tanks.

Green Infrastructure (GI)

Green infrastructure is a network of natural and semi-natural features, such as green roofs, rain gardens, and wetlands, that provide a range of benefits to both people and the environment. These benefits include:

* **Stormwater management:** GI features can capture, retain, and treat stormwater runoff, reducing the volume and pollutant loads that are discharged into nearby waterways.
* **Habitat creation:** GI features can provide habitat for a variety of plants and animals, helping to support biodiversity in urban areas.
* **Microclimate regulation:** GI features can help to cool and humidify the air, reducing the urban heat island effect and improving air quality.
* **Aesthetic and recreational value:** GI features can improve the visual appeal of urban areas, and provide opportunities for recreation and relaxation.

Examples of GI features include:

* **Green roofs:** A layer of vegetation and growing medium installed on the roof of a building. Green roofs can reduce stormwater runoff, lower building energy costs, and improve air quality.
* **Rain gardens:** A shallow depression in the ground that is planted with native vegetation and designed to capture and treat stormwater runoff. Rain gardens can help to reduce flooding and erosion, and provide habitat for pollinators.
* **Bioswales:** A vegetated channel that is designed to convey and treat stormwater runoff. Bioswales can help to reduce the velocity of stormwater flow, and remove pollutants through filtration and biological processes.
* **Wetlands:** A wetland is an area that is inundated or saturated by surface water or groundwater. Wetlands can provide important habitat for a variety of plants and animals, and can help to improve water quality by removing pollutants and sediments.

Low Impact Development (LID)

Low Impact Development (LID) is a design approach that aims to minimize the impact of development on the natural environment. LID practices are designed to mimic natural hydrological processes, and can be

used to manage stormwater runoff, reduce erosion, and protect water quality.

LID practices include:

* **Bioretention:** Bioretention systems are designed to capture and treat stormwater runoff in a shallow, vegetated basin. These systems use a combination of soil, plants, and engineered media to remove pollutants and sediments from stormwater runoff.
* **Permeable pavement:** Permeable pavement is a type of pavement that allows stormwater to infiltrate through the surface, rather than running off into nearby waterways. Permeable pavement can be made of a variety of materials, including concrete, asphalt, and porous pavers.
* **Vegetated filter strips:** Vegetated filter strips are areas of vegetation that are planted along the edge of a development site. These strips can help to intercept and treat stormwater runoff, reducing the volume and pollutant loads that are discharged into nearby waterways.
* **Infiltration trenches:** Infiltration trenches are shallow, underground trenches that are filled with gravel or other porous material. These trenches are designed to capture and infiltrate stormwater runoff, reducing the volume of runoff that is discharged into nearby waterways.

Challenges and practical applications

While GI and LID are promising approaches to stormwater management and drainage design, there are also some challenges associated with their implementation. These challenges include:

* **Cost:** GI and LID practices can be more expensive to install and maintain than traditional grey infrastructure solutions.
* **Space:** GI and LID practices require more space than traditional grey infrastructure solutions, which can be a challenge in densely developed areas.
* **Education and training:** There is a need for education and training for designers, contractors, and maintenance personnel to ensure that GI and LID practices are designed, installed, and maintained correctly.

Despite these challenges, there are many practical applications for GI and LID in urban areas. For example:

* **Urban redevelopment:** GI and LID practices can be incorporated into urban redevelopment projects to improve stormwater management and water quality, while also providing amenities for residents and visitors.
* **New development:** GI and LID practices can be incorporated into new development projects to minimize the impact of development on the natural environment, and to provide amenities for residents and visitors.
* **Retrofit:** GI and LID practices can be retrofitted into existing development projects to improve stormwater management and water quality, while also providing amenities for residents and visitors.

In conclusion, Green Infrastructure and Low Impact Development are two important concepts in the field of stormwater management and drainage design. These approaches prioritize the use of natural systems and practices to manage stormwater runoff, rather than relying solely on traditional grey infrastructure solutions like pipes and tanks. While there are challenges associated with the implementation of GI and LID, there are

also many practical applications for these approaches in urban areas. By incorporating GI and LID into urban redevelopment, new development, and retrofit projects, it is possible to improve stormwater management and water quality, while also providing amenities for residents and visitors.