

Introductory Guide on Greening in Buildings



Potted plants



Fixed planters



Vertical planting in modular systems



Garden Furniture



Modular planting on roofs



Planting on facade



Fish/water ponds



Landscaping on roof/podium

I. INTRODUCTION

Purpose

- To provide an easy reference for safe provision of greening in buildings.

Building Safety and Greening

- Greening in a building may be in various approaches, forms, extent and locations.
- Landscape on roofs, podiums or sky gardens may range from sophisticated podium and sky gardens to simple planting of natural vegetation in shallow growing medium.
- Landscapes in the context of plant species, soil properties in compaction, irrigation, ancillary installation with their effects on the structural, drainage, fire safety, as well as subsequent maintenance and management commitments of a building may vary significantly.
- Building safety and structural integrity of the building should be the prime consideration in the planning, design, construction and maintenance of greening and/or any landscaping.

Greening/Landscaping in Buildings

Greening/landscaping comes in all shapes and sizes and may situate:

- at ground level,
- on roof,
- in sky garden,
- on podium,
- on vertical surface or on building facade.

Contribution of Our Landscape to HK's Liveability

Greening and landscaping in buildings help improving:

- Urban living condition
- Ecology
- Energy saving
- Quality of living

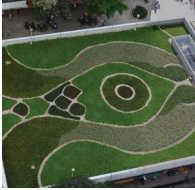
Common types of greening:



Potted plants



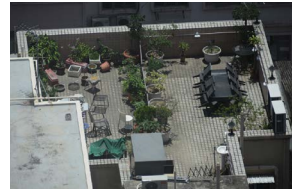
Fixed planters



Landscaping/planting on roof/podium



Planting on facade



Garden features – fish/water ponds, garden furniture etc.



Planting in trays or modular systems

II. PLANNING AND DESIGN

Before You Begin

Do You Need Approval?

- Depends on the location, extent of the proposed greening and its effects on the structural and drainage design of the building.
- No, if the greening proposal does not involve any new building works (e.g. addition of new building structure, strengthening of existing structure, modification of existing drainage system).
- Yes, if:
 - (i) Greening involves new building works
 - (ii) Greening in existing buildings that significantly affects the load bearing capacity, drainage system or fire safety, or there is an associated change in use.

Do Size and Scale Matter?

- In general, larger or heavier planting, features or related installations alike has more substantial impact on the existing building structure, especially if it is placed on critical elements such as long-span roof/podium structures and cantilevered structures.

Should Professional Advice be Sought?

- To ensure safety, qualified professionals, such as Authorized Person (AP) and/or Registered Structural Engineer (RSE), should be consulted on the feasibility of the proposed greening in buildings and whether prior approval is required. Refer to Table 1 for details.
- For selection of greening, soil type and plant variety which may affect the loading imposed on the building, landscaping expertise such as Registered Landscape Architect may be consulted.

Examples	Less Loading Concern	More Loading Concern
Potted plant	 <p data-bbox="356 432 572 456">Lightweight and small</p>	 <p data-bbox="714 432 945 456">Heavy and large in size</p>
Roof farming	 <p data-bbox="406 727 521 751">Small scale</p>	 <p data-bbox="785 727 873 751">Intensive</p>
Garden furniture	 <p data-bbox="342 975 585 999">Lightweight and movable</p>	 <p data-bbox="686 975 972 999">Heavy and permanently fixed</p>
Garden feature	 <p data-bbox="434 1222 493 1246">Small</p>	 <p data-bbox="779 1222 876 1246">Extensive</p>
Flower bed	 <p data-bbox="415 1474 512 1498">Localized</p>	 <p data-bbox="779 1474 876 1498">Extensive</p>

Structural Verification





Loading Considerations

- Additional loading of the greenery and its associated features imposed on the building structures depends on the type of soil, vegetation, usage of area, etc.
- Whether the structural members can take the additional loading depends on the original design, the actual usage, conditions, etc.

Assessment and Design

- AP/RSE are required to check the relevant record drawings and conduct condition survey of the structures concerned to ensure accurate assessment and proper design for the proposed greening.

Special Concerns

<p>(i) Inaccessible roofs</p>  <p>Designed to cater for loading for maintenance purpose only. It may not be suitable for greening</p>	<p>(ii) Long-span roof/podium structures</p>  <p>Sensitive to additional loadings</p>
<p>(iii) Cantilevered structures</p>  <p>Susceptible to accelerated deterioration due to water from greenery and additional loading</p>	<p>(iv) Water ponds and associated features</p>  <p>Impose heavy loading on the building and cause water seepage thus accelerating deterioration of the building</p>

Get the System Right

Drainage and Waterproofing

- If the existing drainage system is inadequate or not suitable for greening, additional or specific drainage provision is required to avoid water ponding and overloading of the building structure.
- Effective discharge of rain water from greening during heavy rainfalls should be allowed.
- Surface fall of not less than 1:80 should be provided to the roof and the greenery.
- All drainage, irrigation as well as waterproofing provisions should be inspected and maintained regularly.
- Where leakage, blockage or defects are detected, they should be rectified immediately.



Provision of drainage outlet in greening to discharge excess water



Improper maintenance of drainage system

- Proper waterproofing of the roof/podium should be ensured before the provision of greening to avoid water seepage causing structural damage.



Proper installation, protection and upkeep of waterproofing layer on roof/podium



Inadequate or damaged waterproofing may result in water seepage and spalling of structural elements

Fire Safety and Potential Inappropriate Uses

- Certain roof or floor areas of a building may be designated as “Refuge Floor” providing refuge for occupants in case of fire. The extent of the refuge cannot be reduced and/or obstructed by greenery or any other use.



Maintenance Access and Protective Barriers

- Access and safety provisions for maintenance of the greenery areas should be provided.
- Protective barriers, such as railing, should be provided at the outer edge for the safe access to the greenery area and to prevent the risk of falling.



III.CONSTRUCTION

Proper Job Done Brings Peace of Mind

Qualified Contractor and Adequate Site Supervision

- Qualified contractors should be engaged for carrying out the associated building works.
- Adequate site supervision is essential to ensure that the work procedures are adhered to and the materials specified are used.

Subsequent Change of Mind

- If you change your greening proposal, the design parameters and assumptions should be clearly stated and the final design requirements, including soil type and weight, plant types, moisture retention requirements, irrigation frequency/intensity, etc. should be well documented.

Completion

- The engaged professionals should carry out quality site supervision during installation and before certifying completion of the greening to ensure the workmanship, quality and the right materials are used.
- If a light-weight growing media or any proprietary or pre-fabricated system is proposed, the relevant professional must check whether the proposed product/system is installed according to the specifications.
- The professional should provide the design and maintenance information to the building owners for proper keeping of the greening.



IV.MAINTENANCE & UPKEEP

Regular Maintenance

- The owner should ensure that regular inspection and maintenance of both the greenery and the building itself are carried out to ensure that safety of building structures and hygiene as well as environmental condition are not adversely affected. Refer to Table 2 for details.

Changes

- Changes in material, such as plant type or growing medium, may alter the designed loading allowance.
- To ensure safety, it is essential that any intended change will not affect the original design parameters, otherwise professional advice should be sought.
- Qualified professionals should be engaged for assessment before such intended change.



Table 1: Points to Note for Provision of Greening in New and Existing Buildings

Newly Proposed Greening	
New Building	Existing Building
<ul style="list-style-type: none"> - Appoint AP/RSE 	<ul style="list-style-type: none"> - Consult AP/RSE/building professionals
<ul style="list-style-type: none"> - Cater for greening in design - Include provision of greening in building, structural and drainage plans for approval and consent from the BD as appropriate. 	<ul style="list-style-type: none"> - Consider implications of greening on the existing building, including structural, drainage and fire safety - Assess whether submission to the BD for approval of the greening proposal is necessary. If yes, appoint AP/RSE. - Submit relevant plans to the BD for approval if alteration and addition, or structural strengthening works are required.
<ul style="list-style-type: none"> - Appoint registered contractor for carrying out of associated buildings works 	<ul style="list-style-type: none"> - Appoint registered contractor for carrying out of associated buildings works

Existing Greening	
Greening Approved by BD	Greening Not approved by BD
<ul style="list-style-type: none"> - Ensure existing provision, installation and usage is consistent with the original design and intended use. Otherwise, an overall assessment is required. 	<ul style="list-style-type: none"> - Consult AP/RSE/building professionals on effects of provision and installation on the existing building, including structural, drainage and fire safety
<ul style="list-style-type: none"> - Rectify any defects promptly 	<ul style="list-style-type: none"> - Remove the associated provision and installation promptly if there are signs of overloading or safety concern - Rectify any defects promptly - Remove unauthorised building works - Submit a proposal to BD for approval if necessary
<ul style="list-style-type: none"> - Inspect and maintain regularly 	<ul style="list-style-type: none"> - Inspect and maintain regularly

Table 2: Good Maintenance Practices

Regular and proper maintenance of the greening and building structures concerned, including the following:

- Proper irrigation, weeding and pruning to ensure that vegetation remains healthy and in reasonable growing condition, and to avoid overgrown vegetation or excessive weedy plants causing public nuisance or potentially overloading the building structure.
- Regular inspection and removal of debris, leaves litter and overgrown vegetation that may encroach rainwater outlets, weepholes or gutters. Proper and timely upkeep is necessary to avoid blockage and to ensure proper functioning of the drainage system.
- Prompt rectification of spalled concrete elements, dilapidated structural elements and water seepage due to defective waterproofing.
- Properly secure trees/plants with potential risk of falling from a building, especially enhancing the securing measures before wet season or approach of typhoon.

Useful links

- List of building professionals registered under the Buildings Ordinance, including AP/RSE/Contractors/Inspectors (<http://www.bd.gov.hk>)



- Building Records Access and Viewing On-line (BRAVO) system enables the public to inspect and obtain copies of private buildings and minor works records (<http://bravo.bd.gov.hk>)



- FAQ on greening (<http://www.bd.gov.hk>)



- Green Technology and the Greening Guidelines - Greening, Landscape and Tree Management Section, Development Bureau (www.greening.gov.hk)

