Briefing for Green Roof in Schools
Built/Maintained by ArchSD
17 June 2016
Program

Introduction

Landscape Design and Plant Selection for Green Roof in School

Maintenance of Green Roof in School

Recent Preliminary Inspection to the Schools completed with Green Roof before handover to SSB but currently not maintained by ArchSD
Introduction
Green Roof – ArchSD Role

Construct Green Roof on New School Buildings under Head 703
- 48 Schools completed since 2003
- 1 government school currently maintained by ArchSD;

Retrofit Green Roof on Existing Government School Buildings
- 28 Schools completed since 2003
- all under ArchSD maintenance;

Maintenance of the building structure for Government School Buildings
Green Roof Maintenance – General Tips

General Maintenance issues - Structural aspect to be covered later

Tree root punching through planter box – seek maintenance agent advise
Green Roof Maintenance – General Tips

Debris/weeds blocking drain outlets - routine cleaning needed
Green Roof Maintenance – General Tips

In case there are trees in doubtful health conditions – conditions to be monitored
Landscape Design and Plant Selection for Green Roof in School
Benefits of Green Roof

Environmental
Ecological
Economical
Aesthetic
Psychological
Educational

Image Source: Greening, Landscape and Tree Management Section, DEVB
http://www.greening.gov.hk

Landscape Design and Plant Selection for Green Roof in School
Content

Design Intention

Types of Green Roof

Typical Sections

Plant Species

Softscape Maintenance
Design Intention

INTENSIVE

EXTENSIVE

Landscape Design and Plant Selection for Green Roof in School
Types of Green Roof

INTENSIVE GREEN ROOFS:

- Deep soil 厚土
- Full plant range 全面的植物種類
- Wide range of uses 廣泛適用於各工程
- Higher capital & recurrent costs 建設成本和經常成本較高
- Better Green Roof Benefits 較佳綠化屋頂效益

Growing Medium 種植層
Total depth: 30cm to 1.5m 總厚度: 30厘米至1.5米

EXTENSIVE GREEN ROOFS:

- Shallow soil 淺土
- Limited plant range 植物種類有限
- Retrofitted 適用於復修工程
- Low capital & recurrent costs 建設成本和經常成本較低

Growing Media 種植層
Total depth: 8cm to 15cm 總厚度: 8厘米至15厘米

Landscape Design and Plant Selection for Green Roof in School
Retrofit Projects on Existing Structures

Source: DEVB Skyrise Greenery Application in School
Typical Section

Landscape Design and Plant Selection for Green Roof in School
Green Roofs on New Buildings

1. Multi-purpose green roof
   - Intensive or extensive green roof or both to cater for different types of roof
   - For educational purpose and environmental improvement
   - Contain other greening elements i.e. vertical greening

2. Educational green roof - type A
   - Intensive and/or extensive green roof with general educational activities, e.g. general plant science, organic farming etc.

3. Educational green roof - type B
   - Extensive green roof with limited or special designed educational activities, e.g. scientific experiment for heat island effect, photovoltaic system, wind turbine etc.

4. Environmental green roof - type A
   - Extensive green roof for heat reduction and visual enhancement
   - Mainly lawn or groundcover with minimum loading requirement

5. Environmental green roof - type B
   - Green roof features with special design to cater for load-bearing capacity in specific location
   - Example: planters siting on structural column/beam, potted plant, pergola

Source
DEVB Skyrise Greenery Application in School
Typical Section

Landscape Design and Plant Selection for Green Roof in School
1. Clean up rooftop surface
2. Install root barrier
3. Install drainage composite layer
4. Install water retention mat
5. Placing planting soil
6. Place plant materials

Source: DSD Project
Typical soil depth for extensive green roof:
- 150mm for ground cover/turf planting for new roof;

Typical soil depth for raised up planters on structures/roofs:
- 300mm for ground cover / grass
- 600mm for ground shrubs
- 1200mm for tree planting
Plant Species


Right Plant at the Right Place !!!

Landscape Design and Plant Selection for Green Roof in School
How to use this Pictorial Guide

Basic plant information for plant identification

Type of skyscraper greenery applications

Recommended soil depth

Seasonal effect

Support methods (limited to vertical greening)

Features and points of interest for plant appraisal and selection

Vertical greening:
- Planting works on the vertical surfaces of buildings and wall-like structures

Intensive green roof:
- Consists of deeper soil depths
- Supports a greater diversity and wider plant range
- Requires higher maintenance and irrigation input
- Provides access for active use
- e.g. podium gardens, green roofs, and sky gardens

Extensive green roof:
- Consists of shallower soil depths
- A narrower plant range
- Requires minimal maintenance and irrigation
- Provides access for maintenance purpose only

Irrigation frequency
- Low: Every two weeks
- Medium: Every week
- High: Every day

Fertilising frequency
- Low: Once a year
- Medium: Every 6 months
- High: More than once per 6 months

Pruning frequency
- Low: Once a year
- Medium: Every 6 months
- High: More than once per 6 months
Example – *Zephyranthes candida*

**Family:** Liliaceae

**Scientific Name:** *Zephyranthes candida*

**Common Name:** Autumn Zephyr-lily

**Chinese Name:** 蕙蓮 (玉蓮)

**Tolerance:**
- Strong Wind
- Salt Spray
- Drought
- Pollution
- Shade

Landscape Design and Plant Selection for Green Roof in School
Softscape Maintenance

- Plant Conditions
- Drainage
- Irrigation
- Pest & Diseases
- Weeding
- Fertilizing

Landscape Design and Plant Selection for Green Roof in School
Maintenance Requirements

Landscape Design and Plant Selection for Green Roof in School
Plant Condition

Weeding

Landscape Design and Plant Selection for Green Roof in School
Irrigation Point
Edge Condition

Landscape Design and Plant Selection for Green Roof in School
Drainage
Maintenance of Green Roof in School

校舍綠化天台的保養
General Observation

• no observable maintenance deficiency related to the green roof projects completed by ArchSD

• as long as the green roof is properly designed and constructed, there should be no specific building maintenance issue compared with similar structures without green roof.
Water Tightness

• Green roof should be properly attended to prevent any potential damage to the existing waterproofing layer.

• No evidence that the greening facilities will adversely affect the watertightness of roof structure so far.
Structure

• Before installation of green roof, conduct structural assessment by Registered Structural Engineer

• Maintenance check for any structural defect where necessary, e.g. cracks, spalling concrete, water leakage, etc.
Routine Management
Attendance & Inspection

- Attendance to clear surface channels
- Check Subsoil drainage and any movement joints under greening facilities
- Regular watering & fertilizing.
- Regular weeding, plant cutting & monitoring plant growth
Recent Preliminary Inspection to the Schools completed with Green Roof before handover to SSB but currently not maintained by ArchSD
(Observations in respect of Structural Safety)
• Government Schools : maintained by ArchSD
• Non – government Schools : maintained by school/EDB
• Preliminary Inspection in early June 2016 to 48 new Schools built by ArchSD
• Loading of original greening – already taken account in building design
• During this inspection, subsequent alteration & addition of greening was found in some schools.
• Sign of immediate danger at the time of inspection was not found, however follow up action is required
Addition of large area of greening:

Large additional planters -> Increase in loading
Extensive addition of pot planters - -> Increase in loading
Addition of large planters concentrated at small area -> Increase in loading
Change of use of the roof -> Change of loading
Minor cracks found at some RC beams under green roof – require further inspection and investigation to determine whether the cracks are structural cracks caused by overloading
Leakage problems found at some schools - may lead to deterioration of the structure in the long term – remedial works asap
Suggested Follow Up Action

- Schools not maintained by ArchSD is subject to Buildings Ordinance under which BD submission and statutory compliance checking is needed
- Seek professional advice from AP/RSE
- Proper maintenance and repairs to the green roof, including drainage system, and the supporting structure roof
Thank You