

# Appendix A – Maintenance Plans

## Green Roofs

### Example Maintenance Plan for Residential Extensive Green Roof

(Source: Green Roofs for Healthy Cities, 2011, Advanced Green Roof Maintenance Manual),

Planting year:

- Bi-weekly inspection of drainage capabilities.
- Bi-weekly inspection of roof drains.
- Bi-weekly inspection of vegetation-free zone.
- Periodic weeding and confirmation of plant health.
- Periodic removal of unwanted debris from trees above, if applicable.

The following year and minimum annually or as necessary to the end of the lifespan of the green roof:

- All above performed monthly.
- Programs of routine maintenance and inspection sufficient to ensure that the green roof components perform their required functions for the duration of their design service lives.
- Periodic inspection of drainage panel to ensure conveyance away from plants.
- Monthly inspection of plant material to ensure proper growth and rooting and potential re-planting should that be necessary – so that complete coverage is attained by year three.

### Example Schedule for Extensive Green Roof in Northern Temperate Climate

(Source: Green Roofs for Healthy Cities, 2011, Advanced Green Roof Maintenance Manual),

	Remove Weeds	Clear Drains	Clear Veg.-Free Zones	Refill Substrate	Re-sow (seeds/clipping)	Replace Vegetation	Fertilize	Irrigate
Spring (Apr – May)	e	e	e	O	O	O	e	O
Summer 1 (Jun – Jul)	e	e	e	O				O
Summer 2 (Aug)	e	e	e	O				O
Fall (Sep – Oct)	e	e	e	O	O	O		O

e = to do; O = as needed

## Intensive: Chicago City Hall Green Roof Landscape Maintenance Plan

(Source: *Green Roofs for Healthy Cities, 2011, Advanced Green Roof Maintenance Manual*),

The following maintenance operations are suggested to best care for the plants that will be part of the City Hall green roof system.

### Installation Care - Gardener

**1. Post Planting Care** - A component critical to the establishment of the plants is supplemental watering during the first growing season. This will include immediate watering after planting, and then up to 36 occurrences or three times per week for thirteen weeks. This is especially important during a hot dry spell.

**2. Weeding** - As the plants begin to establish, weeds or undesirable volunteer plants may become prevalent until the new plants provide some competition. It will be important to work with a gardener who knows how to identify these undesirable plants and remove them in a timely manner, i.e., before they have had time to set seed. This will need to be done at least three times a week immediately after planting for eight weeks and then tapered to once per week for the remaining weeks of the growing season.

**3. Dead Heading Perennial and Herbaceous Plants** -To ensure that the plants look their best all season, it is important to remove spent flower blossoms every week. This will maintain plant health, shape, and aesthetic qualities.

**4. Staking** - Containerized garden plants, especially perennials, can get lanky, therefore, it is important to have a staking program where weekly the plants are checked to see if they are leaning or losing their form.

Use green bamboo (or similar aesthetically pleasing staking tool) to tie up and keep the perennials in organized masses.

**5. Erosion Control** - The garden should be checked for any areas that are susceptible to wind or water erosion. Any areas that show signs of erosion should be repaired and steps taken to prevent future erosion.

### Long-term Care - Landowner Care (in addition to items listed above)

**1. Monitoring Program** - A regular, bi-weekly monitoring program assessing the condition of the garden and plants will be important for containing any pest problems before they spread, as well as making sure that the plants are growing well in the areas they were planted. Monitoring will also bring about new ideas for supplemental planting, redesign, or species replacement.

**2. Supplemental Planting** - There may be areas where the selected plants do not grow or thrive as anticipated. To ensure that the rooftop always looks its best, it is important to budget for an annual supplemental planting program. Also, as the crowns of the trees and shrubs develop, additional shade tolerant species should be planted.

**3. Perennial Division Program** - Over time perennials need division in order to grow well. The divided perennials can then be placed in other spots of the garden, or be utilized for other purposes, like planting them on other green roofs, for employee give-aways, etc. This program should be performed every three to four years.

**4. Pruning/Trimming** - The woody plants will need a regular program of trimming excess growth, maintaining the shape of the woody trees, and keeping open canopies to promote healthy growth and aesthetic value. This program should be performed mainly in the late season.

**5. Tree Root Pruning** - Since the trees will be in a confined space, a tree root pruning program, performed every three to four years, will be needed to keep the trees contained in their small rooting areas. A specialized arborist service should be contracted to evaluate the proper way to prune the roots to maintain health and contain the plant. This process is similar to bonsai root pruning.

**6. Pest Control** - Although a good maintenance program minimizes pests and diseases, there may be unpredicted stressors that could affect plant health. There could be situations where aphids or mites afflict the plants, or the pest may be mice or pigeons that become a nuisance and impact the health of the plants. A budget amount for pest control will be needed.

**7. Mechanical Equipment** - The green roof is located near the building's mechanical equipment. Areas surrounding this equipment should be checked regularly and should be kept clear of vegetation.

**8. Drainage** - The overflow boxes and drains should be checked monthly and should be kept clear of any obstructions.

**9. Irrigation System Maintenance/Winterizing** - Part of the maintenance program will include maintaining the irrigation system. Drip irrigation systems may need to have some lengths replaced. Additionally, the system's water has to be emptied as part of a winterizing program. In some instances, an early freeze may cause the residual water to freeze and the pipes to crack, resulting in the need to replace the PVC pipe.

### Green Wall Maintenance Basics

Living walls and green facades can vary dramatically in design, components, system, context, and complexity – because of this, maintenance plans are less likely to be standardized and more customized to each individual project. All green walls require maintenance to be healthy, but generally, living walls require more maintenance than green facades. A maintenance plan for **living walls** should address the following:

- Monitoring schedule
- Method of accessing plants on the wall (Most local building codes require that all workers have fall safety training before they work at heights)
- Irrigation requirements
- Plant nutrient requirements
- Soil quality maintenance
- Pruning requirements
- Disease and pest control. In many jurisdictions the application of most treatments to control pest requires a pesticide applicator license. This may be true even for organic treatments such as insecticidal soap. For example, in some areas it is illegal to spray a simple dish soap and water mixture to control aphids. When possible, use a natural pest control method within and Integrated Pest Management program.
- Methods of plant or module replacement.
- Adjustments to underlying systems to accommodate growing weight.
- Methods of accessing the underlying mechanical systems (e.g. irrigation lines, solenoids and pumps, if present).

A maintenance plan for **green facades** should address the following:

- Irrigation requirements
- Soil amendments (e.g. fertilization and mulch)
- Access to plants on the wall
- Plant inspections for disease and pests
- Rates and methods for pruning and training leaders
- Adjustments to underlying systems to accommodate growing weight (e.g. tightening cables)
- Methods of accessing the underlying wall structure for repairs. This should include a detailed guide on plant storage and maintenance when removed from the wall.