

## **Guidelines on Basic Requirements for Planting and Irrigation in Public Green Areas**

### **Objective**

The objective of these guidelines is to indicate the basic planning principles of pavements and public greening in newly built districts, including planning requirements for greening of pavements, principles of plant layout, general requirements for planting and irrigation systems, and the important points to be observed when public green areas are affected by construction works, so that the relevant units can carry out planning and execution in accordance with the guidelines.

### **Scope of applicability**

The guidelines are applicable to the public green areas managed by the Municipal Affairs Bureau (IAM).

### **Contents**

#### **I. Planning requirements for greening of pavements in newly built districts**

Pavements in newly built districts should have some green space. If the overall width of the pavement in the district is less than 5 metres, it is necessary to ensure that the width of the pavement is 2.5 metres, with the remaining part suggested to be used as the green space, with a minimum width of 80 centimetres. If the overall width of the pavement is greater than 5 metres, it is suggested that the ratio between the width of the pavement and the green space should be maintained at 3:2. Moreover, for the reasons of plant growth and maintenance, the area underneath the planting space should be without pipes. In case of having common pipes, the depth of soil coving the common pipes must be at least 2 metres deep above the common pipes so that there is a sufficient layer of soil to place the trees. It is suggested the green space should be planted with trees, small or medium shrubs, among other plants, with the following requirements:

Overall width of pavement	Requirements for space occupied by plants (area without pipes)	Types of plants						Figures	
		Trees			Shrubs		Herbaceous plants		
		Small	Medium	Large	Small	Medium			
$\geq 3.3$ m and $\leq 5$ m	2.5 m for pavement and the rest for green space	○	○		○	○	○	○	A
$> 5$ m	Proportion between the width of pavement and green space = 3 : 2	○	○	○	○	○	○	○	B

Note: It is necessary to set up fences and reserve spaces for the passage of pedestrians or the loading and unloading of goods.

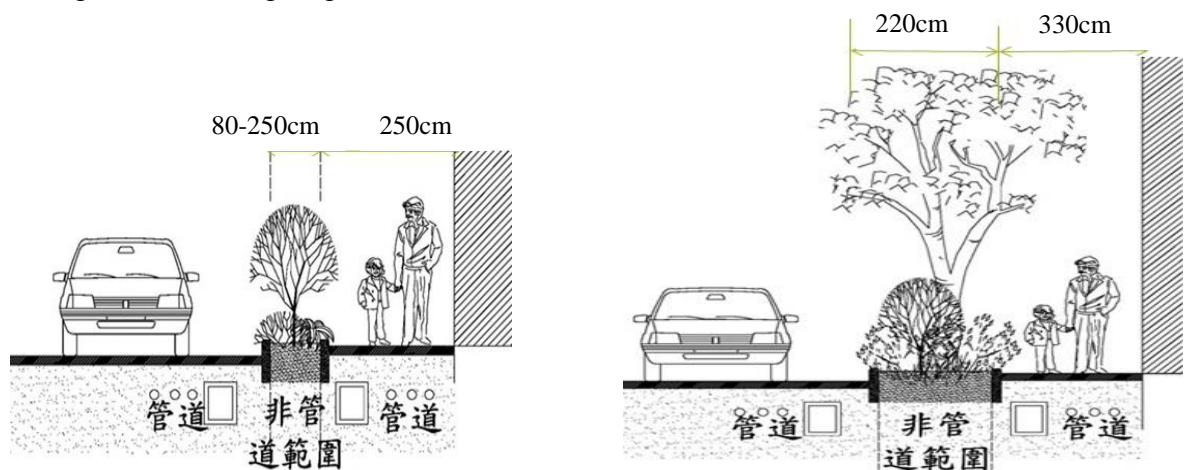
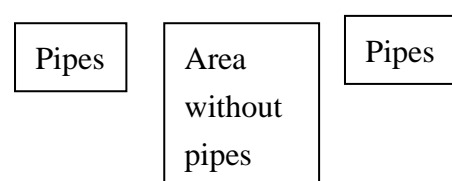
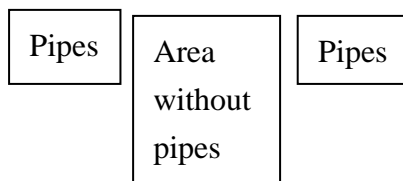


Figure A

Figure B



## II. Requirements for planting soil

1. If a green belt originally has a cement base or bituminous pavement, it is necessary to remove this hard layer and ensure that the drainage in the green belt functions properly.
2. In the green belts, it is forbidden to contain construction waste and garbage with diameter greater than 5 cm, e.g. cement and bitumen blocks, wood and iron waste, bricks, small and large stones, etc.
3. The green belts should be backfilled, using mixed soil made up of 60% mountain soil, 25% peat, 10% perlite and 5% pond mud in small pieces (in proportion to the volume).
4. The soil depth required for backfilling the whole green belt is 1.5 metres or more.
5. If planting beds are used as the means of greening, there must be sufficient number of drain outlets in the beds, with the drain outlets covered with chrysanthemum-shaped draining components and wrapped with geotextile fabric to prevent the soil from clogging the drain outlets.
6. The depth of soil layer in the planting beds should depend on the type of plants, backfilled with mixed soil made up of 30% mountain soil, 40% peat, 30% ceramsite and gravel (in proportion to the volume). The depth of soil layer is as follows:

Type of plant	Seasonal flowers	Bush	Small tree (3-6 m tall)	Medium or large tree (above 6 m tall)
Depth of soil layer	30 cm or more	50 cm or more	1.3 m or more	1.5 m or more

Table 1: Requirements for depth of soil layer in the planting beds

### **III. Requirements for irrigation system**

The suitable irrigation system can be designed on one's own in the light of the actual situation, but IAM's approval of the design is required to be obtained or the following can be served as reference.

1. The newly built green area is required to be equipped with an irrigation system and a designated water meter which should be set up separately to avoid connecting it to other public facilities such as public toilets and fountains, so as to avoid influencing the water supply of other public facilities in the case of maintenance or switching off the main switch.
2. In general, an automatic irrigation system along with a manual watering system should be installed in a green area. The depth of the underground water supply pipes should be 30 cm from the soil surface. In addition, the part of water pipes above the ground connecting the nozzles should be 15 cm from the kerbstone to minimise the chances of making the road surface wet.
3. The material of underground water supply pipes should be made of galvanised iron or water pipes of the same quality, and those pipes that connect the nozzles on the soil surface must be high density polyethylene pipes or soft plastic pipes of the same quality with the complete set of sprinklers provided and installed. Besides, all the materials used for water supply must be resistant to heat, ultraviolet rays and wear.
4. For the method of connection of irrigation water pipes, there should be a set of automatic sprinkler system (1 to 1.25 inches, depending on the size of the water meter) connected to a branch of the underground main water supply pipe

(depending on the pipe size of water meter). The sprinkler at ground level is 1/2 to 3/4 inches, depending on the secondary pipe of the automatic sprinkler. This system is required to be set up in individual sets for separate operation so as to suit the actual situation. The manual watering system (3/4 inch pipe) is also required to connect from a branch of the underground main water supply pipe. Therefore, the water supply pipes of the automatic irrigation system should be separated from those of the manual watering system so that the situation where the manual watering system and the automatic irrigation system operate simultaneously does not occur.

5. In general, in a green belt, there should be an adjustable 180° sprinkler nozzle (Fig. 1) in every 3 metres. In an area with a larger surface or corners, it is possible to install a movable sprinkler nozzle with adjustable angles (Fig. 2). If the width of the green belt is greater than 5 metres, it is necessary to increase the number of nozzles in the centre of the green belt in accordance with the actual situation to ensure that the spraying water can cover the entire green belt.
6. For the installation of a manual watering system, it is necessary to install a ball faucet with isolated switch in every 30 metres, which is used for connecting a pipe for manual watering.
7. For the planting beds (flowerpots) with width less than 100 cm, it is necessary to use drip irrigation, and the system must be connected to the adjustable sprinkler and able to be placed on the ground (Fig. 3) with a polyethylene pipe. In general, a sprinkler nozzle should be installed in every 20 cm and the irrigation should cover the whole planting surface with the spraying extent not exceeding the planting beds as the basic principle.

8. In the green belts and planting beds, all the installations such as water valves, water meters, should be protected by metal or plastic boxes with covers and locks.



Fig. 1 The water pipes that connect the nozzles on the ground surface must be high density polyethylene pipes or soft plastic pipes of the same quality. An adjustable 180° brass nozzle should be installed in every 3 metres and the plastic pipe should be 30 cm above the soil surface.



Fig. 2 In a large area or corner, a movable sprinkler nozzle with adjustable angles should be installed.



Fig. 3 For the planting beds (flowerpots) with width less than 100 cm, it is necessary to use drip irrigation.

#### IV. Plant layout and planting requirements

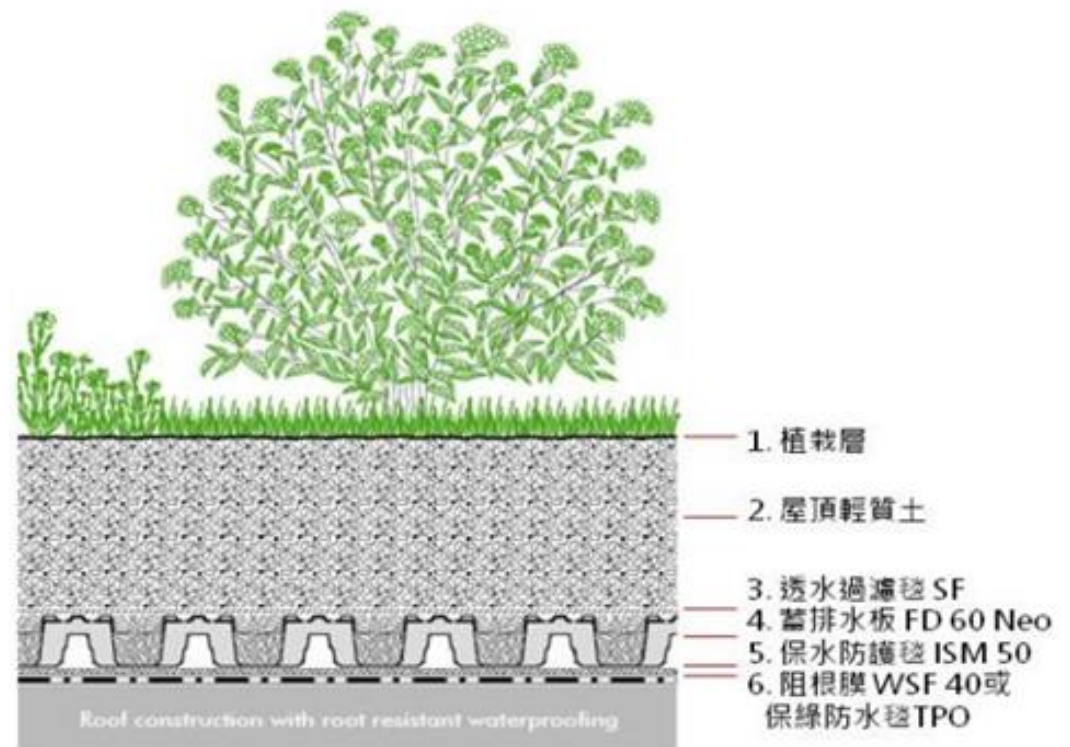
1. For plant layout, if there is enough space to place the plants, it should be done gradually in several layers, i.e. placing the trees, shrubs and herbaceous plants.
2. Trees must be placed at least 5 metres away from road lights, traffic signals or traffic signs, at least 10 metres away (measured along the lane) from intersections of the roads and at least 5 metres from bus stops, zones for loading and unloading goods, pedestrian crossings or vehicle entrances and exits. Besides, the trees should

be planted in places where they do not affect the operation or repair of speed detection cameras and other traffic surveillance cameras / equipment.

3. In order not to obstruct the view of pedestrians and drivers, in roundabouts with a diameter of less than 10 metres, only shrubs and herbaceous plants may be planted, and no trees should be planted there. In green areas 10 metres away from pedestrian crossing facilities, the kerbstone and shrubs must not have a total height greater than 80 centimetres.
4. When planting, it is necessary to plant according to the design drawing or the instructions of the IAM staff. In addition, the planting density should depend on the crown extent of the plant, avoiding the situation where the plants are too sparsely planted and the soil is seen. In general, for bushes with the crown extent of 40 cm, about 9 bushes should be planted in an area of 1 square metre.
5. The plants should have dense foliage and be healthy and free from plant pests. When planting, it is necessary to remove the packaging covering the roots of the plant before planting it in the soil, paying attention with care not to damage the roots. After planting, the packaging bags and any trash must be removed.
6. Before planting, it is necessary to add base fertiliser, such as organic fertiliser like chicken manure. The amount of organic fertiliser used should be  $3.75\text{kg} / \text{m}^2$  and the compound fertiliser should be  $0.15\text{kg} / \text{m}^2$ . Depending on the situation, fertiliser can be added in a pit or in a circular trench. However, the fertiliser cannot come into direct contact with the plant's roots, nor can it be exposed outside the soil.
7. After planting, the soil should be suitably compacted and sufficiently irrigated.

## **V. Greening of roofs or terraces of buildings**

1. For greening of roofs or terraces of buildings, it is necessary to evaluate the load bearing capacity of the roofs or terraces concerned. In order to widen the green area and enrich the greening elements, the work can be carried out in the form of a thin layer of green or landscaped roof if the load bearing is possible. In this case, the roof or terrace is required to have comprehensive waterproofing layer, along with other facilities such as root barrier, water retention and protection sheet, water retention and drainage board and drainage system, planting soil and planting layer, etc. (See Fig. 4)



1. Planting layer
2. Rooftop lightweight soil
3. Filter sheet SF
4. Water retention and drainage board FD60 Neo
5. Water retention and protection sheet ISM 50
6. Root barrier WSF 40 or waterproofing sheet TPO

2. The planting soil used in the thin layer of greening and planting pots should be roof lightweight soil consisted of sandy loam, humus, artificial soil, expanded clay,



zeolites and activator, with overall density (dry weight): 0.8 - 1.0 g/cm<sup>3</sup>. Soil depth for planting layer and lightweight soil samples are defined in Table 1 and Fig. 5, respectively.



Fig. 5

3. If it is not possible to use the form of a thin layer of green or landscaped roof, planting pots can still be used to create a space with plants depending on the load bearing capacity and condition of the roof concerned. In this case, the pots are required to have comprehensive water supply and drainage system, along with other facilities such as root barrier, water retention and protection sheet, water retention and drainage board and drainage system, planting soil and planting layer, etc.
4. The water drainage system for public greening on the roofs or terraces of buildings must meet the following requirements:
  - a) The water drainage system on public green terraces must be independent and must not enter the area on the lower floor of the building.
  - b) It is suggested that a raised floor should be created on public green terraces, allowing for a second drainage of water, avoiding infiltration problems in the

lower floors of buildings. The upper or lower boards of the raised floor must also have effective waterproofing. It will be extremely beneficial if there is enough space for workers to access the raised floor and carry out inspections or repairs there.

- c) The green area must have retaining grids for the leaves of the trees, intended exclusively to collect the liquids coming from the drainage layer, thus facilitating the subsequent cleaning and unblocking work.
- d) The vertical water drainage pipes used in greening must be placed on the exterior walls of the building, in order to facilitate their repair and replacement. A visible surveillance manhole must be installed in the place where the vertical pipes are in contact with the public walkway, so that they are connected to the street hydrants.
- e) The green terrace must be able to drain liquids resulting from a flood. The designer must adapt the drainage capacity of the water collection facilities to the area where water is accumulated and to the volume of precipitation, depending on the intensity of the rainfall.
- f) It is suggested that the drainage system has enough air outlet pipes to guarantee the smooth flow in the water pipes.
- g) The proper slope for the horizontal water drainage pipes should be 2%, thus reducing accumulation situations.
- h) Regarding the diameter of the drainage pipes, it is suggested that pipes of  $\phi$  150 are uniformly used and that outlets are placed in the appropriate locations (taking into account the length of the tools used in unclogging), thus facilitating cleaning and unclogging afterwards.
- i) To join the drain pipes together, accessories with bend of 45° should be used.
- j) Drain pipes must be connected in series, in order to make directional unclogging with tools easy afterwards.
- k) Movable stainless steel grids must be installed in all water collection outlets.
- l) It is suggested that sufficient installations should be equipped to allow for the sedimentation of sand (except the “U” drain) in the lower section of the gutters.

## VI. Maintenance period

1. From the day of completion of inspection of all newly built green areas, the contractors are required to provide greening maintenance for at least 12 months, with

greening maintenance for roof greening of landscape garden design for at least 24 months. The content of maintenance work includes providing all the plants in the areas with irrigation and regular pruning, fertilising, controlling weeds and spraying pesticide, etc., to ensure that such plants can grow healthily. During the maintenance period, if the plants die or their growth retards, the contractor concerned is responsible for replacement of the plants with the same species, specifications and quantity free of charge.

2. During the maintenance period, if there is any damage to the irrigation equipment in the green areas, the contractor concerned has to provide maintenance and repair free of charge to ensure that the spraying equipment can function properly in the areas.
3. After the maintenance period, an inspection for approval is required to be conducted by the IAM staff with the unit or contractor concerned in order to end the work.

## **VII. Green areas affected by construction works**

1. It is necessary to inform IAM staff of the content of the construction works five or more working days before carrying them out, and provide the photos and lists of plants, facilities of irrigation system in the areas affected by the works. Such lists have to be confirmed by IAM, which will be served as the basis of the restoration work in the future.
2. After completion of the construction works, a horticultural company should be hired to carry out restoration work on site in accordance with the requirements of the guidelines, including replanting bushes and turf (same species as the existing ones), normal operation of faucet facilities and backfilling soil, as well as removing all garbage and construction waste on site. After the restoration work has been

completed, it is necessary to inform IAM staff in the area of greening for inspection and approval.

3. To ensure the normal operation of water supply system in the construction area, the contractor is required to carry out repair work immediately if there is any damage. The contractor concerned is entirely responsible for any damage or loss caused by the construction works.
4. During the period of construction works, it is not allowed to place any tools, equipment or miscellaneous objects in the surrounding area of the green belts.