



Sustainable City Designs with Eco-Rain Tank Systems

- I. Roadways
- II. Parking Lots & Garages
- III. Roof Gardens & Planter Boxes
- IV. Sport Fields

Introduction

In nature, more than 90% of the earth's surface is permeable. In a typical city, more than 70% of the earth's surface is *impermeable*. During rainfall, air and surface pollutants accumulate in runoff waters, and typically wash down streets and storm drains into rivers and eventually the oceans.

Additionally, the impermeable surfaces of streets, parking lots, sidewalks, and buildings decrease humidity and cause the temperature to rise. We can reverse these degradations with designs that include permeable surfaces, more vegetation, and tested water filtration systems that mimic nature's way of cleaning water.

I. Roadways

A. Permeable Pavement

The Eco-Rain 2" Drainage Cell, permeable bitumen or porous asphalt and concrete, or porous concrete can be used in lightly traveled streets, pedestrian walkways, and parking lots. The Drainage Cells are made from 100% recycled Polypropylene. Porous asphalt consists of an open-graded asphalt concrete composed of stone aggregate and an asphalt binder.

Permeable bitumen or concrete is laid over the two-inch permeable drainage cell that provides a true void space for water and air circulation. This 'structure' sits on top of a properly compacted soil base. Water that infiltrates through the road surface is collected in the underlying two-inch drainage cells, then directed into Eco-Rain Tanks that run parallel under the side of the road. Infiltration is directed away from the road base, providing underground irrigation of roadside plants and trees.

For heavily traveled streets, use the Eco-Rain Tank System design with traditional surfacing.

1. Advantages to Using Eco-Rain Tank Systems

- a. The system eliminates 'road warping' and 'sink holes'.
- b. The Japanese conducted studies showing that the two-inch void space created by the drainage cell reduces the surface temperature on the average by 17 degrees Centigrade on concrete surfaces and 50 degrees Centigrade on turf. This helps reduce global warming in addition to the local benefit.
- c. The design cleans road runoff waters, making it suitable for landscape and toilet reuse, and discharge to waterways.

d. It eliminates the cost of underground piping and drain inverts. It also eliminates use of additional Storm Water Pollution Prevention devices such as sewer invert filtration systems.

e. Pervious surfacing allows 100% use of the land for structures in developed areas, as compared to use of open detention or retention ponds that require large open-land areas.

f. Eco-Rain Tank products are made from 100% recycled polypropylene, thus reducing use of virgin or earth materials, and reducing landfill.

II. Parking Lots & Garages

A. Garages

The top floor of parking garages can be built with an Eco-Rain Tank System that captures, cleans, and reuses storm water. The Eco-Rain Tank System allows for easy installation of garden areas in parking garages.

B. Lots

Build parking lots with near 100% permeable surfaces that will stay level and free from ponding water. Eco-Rain Tank 2" Drainage Cells are made of durable 100% recycled Polypropylene, that when installed properly has a life expectancy of 20 to 40 years with little to no maintenance. Providing first flush pollution mitigation via pervious surfaces may be the lower cost option when compared to other BMP's. It may also be a lower installation cost than traditional parking lot construction. In addition, pervious surfaces appear to be the lower cost option over the life of the parking area.

1. Advantages

- a. Same as above for roadways.
- b. Eco-Rain Tank Systems can be built to provide recharge of groundwater aquifers.
- c. Improved vegetative and tree growth, and reduced walkway maintenance. Roots remain underground.
- d. Reduced hydrocarbon pollution from reduced use of asphalt pavement and sealers.

III. Green Roofs & Planter Boxes

A. Green Roofs are an essential element in city water management and one of the best hydrological solutions to solve city-induced floods, as well as to reduce global warming. Green Roofs absorb and retain water, reduce interior building temperatures, and assist with air purification.

In cities, roofs are a large percentage of impermeable surfaces. When rainwater washes off roofs, it carries organic materials, bacteria, heavy metals from vehicle exhaust, and industrial pollution.

Eco-Rain Drainage Cells solve complex water management issues easily, and adapt to both flat and pitched roofs. Water management is the single most important issue in establishing a roof garden. The Eco-Rain 1" Drainage Cell is a lightweight, incredibly strong structure through which water and air pass freely. It directs air, gases and water to flow in a vortex motion, which provides an aerobic environment, retarding the growth of deleterious bacteria. The cells provide a moist, humid layer under the plant roots, an ideal environment for optimum growth.

Its' open surface space of approximately 60% allows water to drain into the cell at a rapid rate during heavy storms. The internal structure is 80% open, allowing water to flow easily to a catch basin.

B. Planter Boxes are similar to Green Roofs in design and advantage, and may be built on multiple levels, utilizing more building space, with the added benefit of enhancing the view from all levels, inside and out.

1. Advantages Using the 1" Drainage Cell

- a. Easy and simple installation. The Cells fit together by hand, and are lightweight.
- b. The Cells are incredibly strong and can support heavy loads.
- c. The Cells remove excess water quickly and efficiently.
- d. An ideal growing condition is created - a moist, humid passive irrigation environment in which plants thrive.
- e. The design of the system helps to purify the water, neutralizing contaminants.

As a matter of interest, Germany passed a law that requires use of green roofs. Germany contributes 50% to the cost of building a green roof for both private and public buildings.

IV. Sports Fields

A. *Why use the Eco-Rain Tank System for a sport field?*

- The Eco-Rain Tank System allows every day use of a sport field even during rainstorms because it provides exceptional drainage of the playing surface. Drainage rates exceed 4" (100mm) / hour.
- The Eco-Rain Tank System creates a perched water table beneath the topsoil, maintaining 'field capacity' - optimal moisture and air in the root zone for the most favorable turf. Strong turf is better able to prevent disease and lives longer.
- Sport fields using the Eco-Rain Tank System have a reduced surface temperature, providing a cooler environment thereby reducing transpiration, and increasing player stamina.
- The Eco-Rain Tank Recycling System recovers excess rain and leached irrigation water, thereby reducing irrigation costs.
- The Eco-Rain Tank System works best with the use of organic fertilizer, which is best for the environment, and turf. Less fertilizer is needed because the turf is healthier. Leached fertilizer is recycled and made available to the roots for full use, providing efficient use of resources.
- The Eco-Rain Tank System allows quick recovery of turf after heavy use. The surface stays level with reduced compaction of soil profile; and because the soil is stable, roots live in optimal condition; turf maintains strong growth even after heavy use.
- Eco-Rain Tank products are made of 100% recycled polypropylene, projected to last over 50 years underground. This system has been in use worldwide for over 20 years with no product failure. Fields will last indefinitely with proper maintenance.
- Reduced costs: turf lives longer, less use of imported water, less application of fertilizer and herbicide, no rescheduling of events due to rain.
- Eco-Rain Tank Systems when paired with an appropriate filter will clean rain, irrigation, and runoff water of pollutants.

Conclusion

Eco-Rain Tank Systems are currently improving water quality and management in the following applications:

- Commercial Developments
- Commercial Airports
- Residential Developments
- Road, Bridge and Tunnel Construction
- Sports Field Construction
- Agriculture
- Recreational Developments
- Landfills

Independent tests and testimonials from private and public agency personnel are available upon request. For more information, please contact us:

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