Section III

To Treat or Not To Treat:

Post-Construction Storm Water Treatment Controls

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PART III
OBJECTIVES

To Understand:

Post Construction impacts of storm water runoff

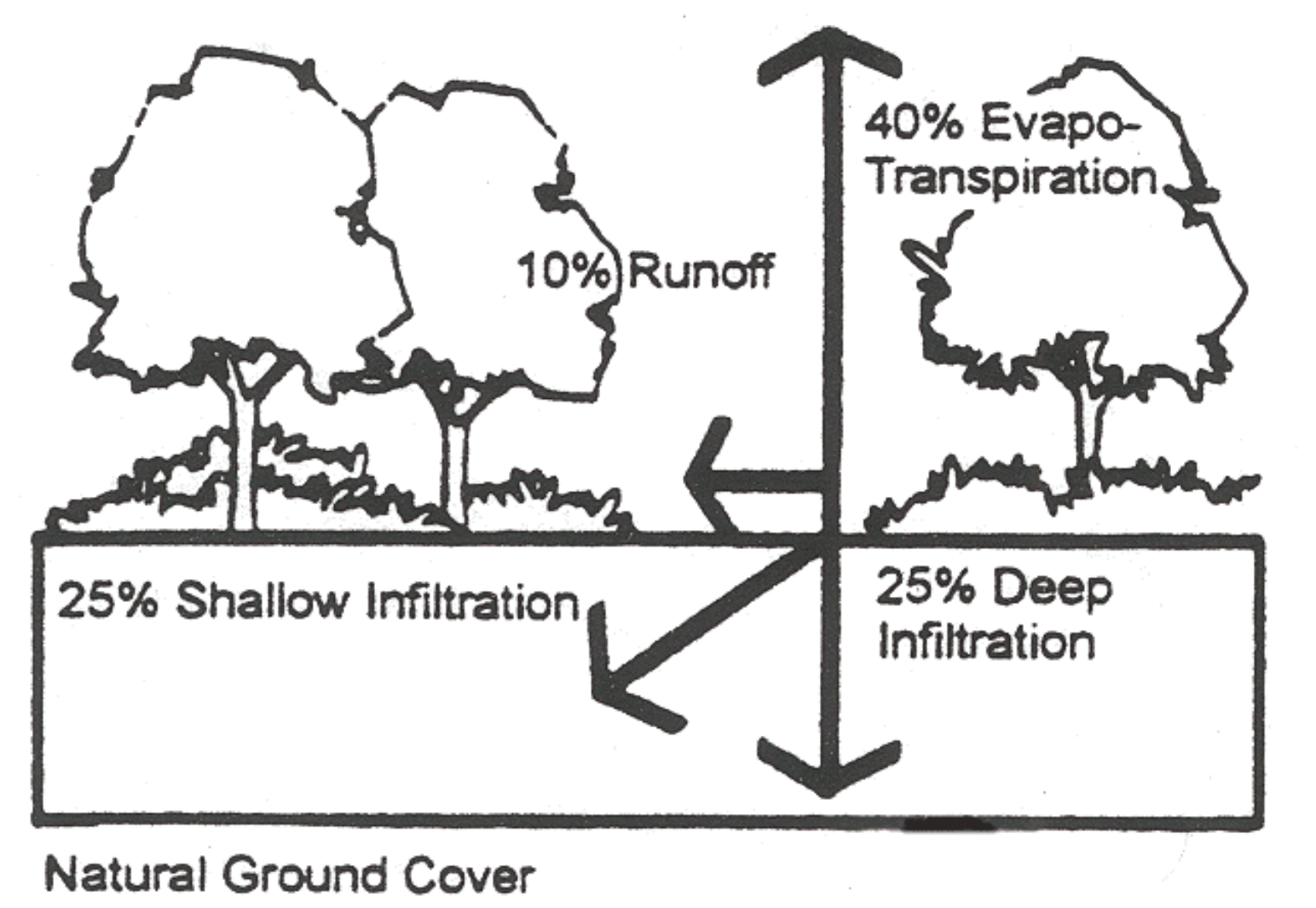
Reasons for Post Construction storm water

Design measures and treatment controls

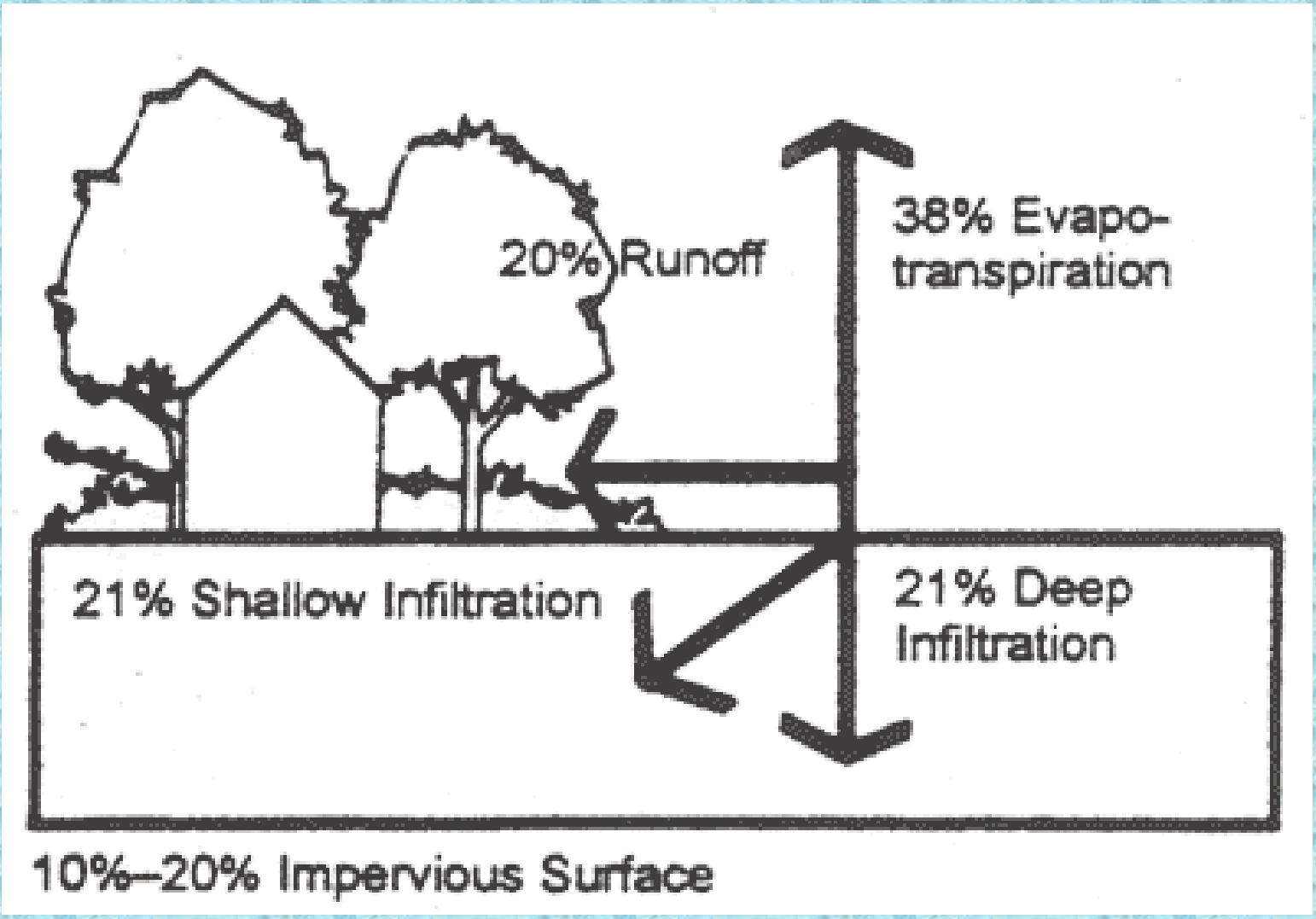
To Evaluate and Explain:

Examples of Post Construction storm water BMP's

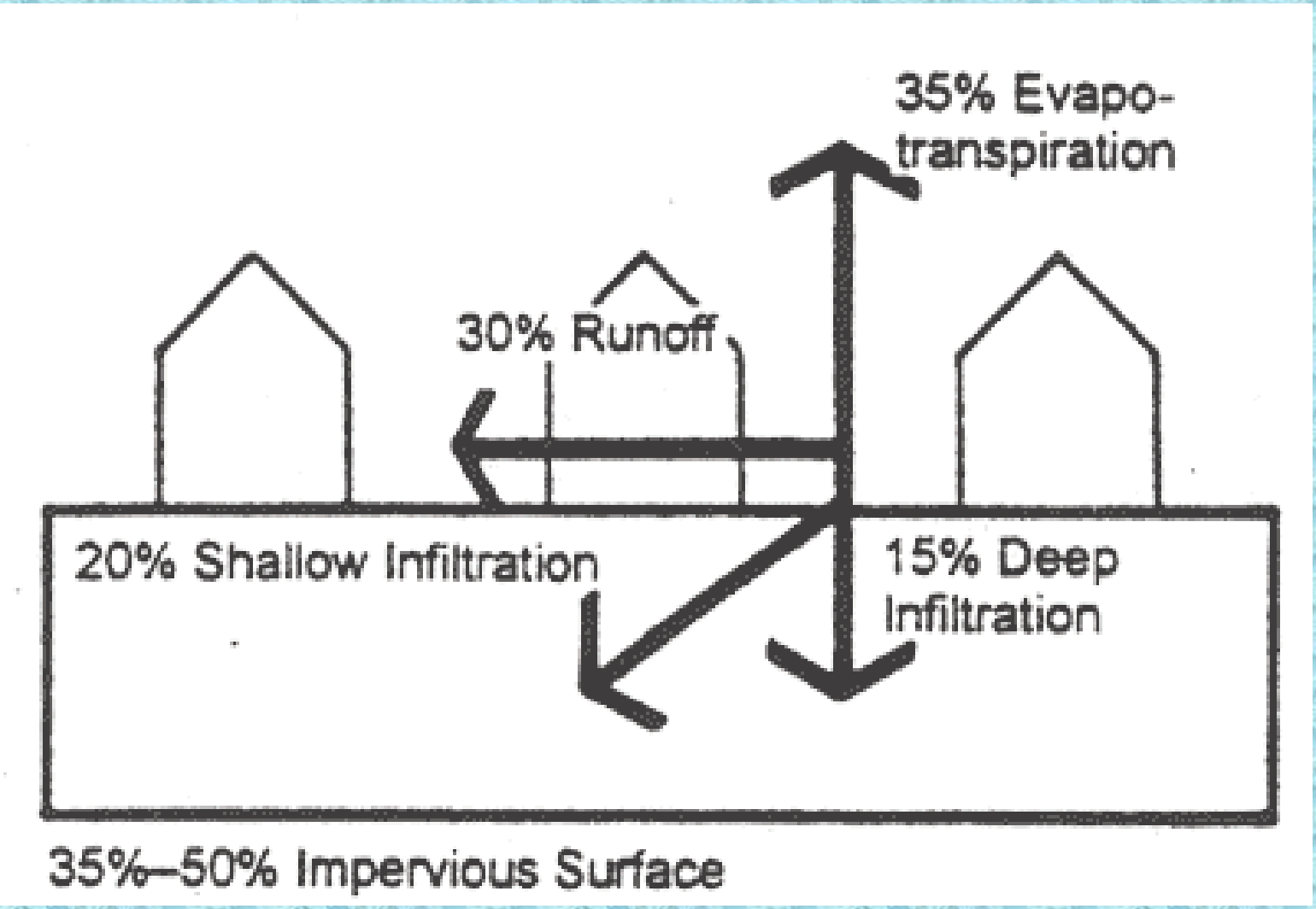
In a purely natural system, that is, an undeveloped area with undisturbed natural vegetation, erosion-causing runoff is very low, generally no more than 10% of the water which falls on the ground.



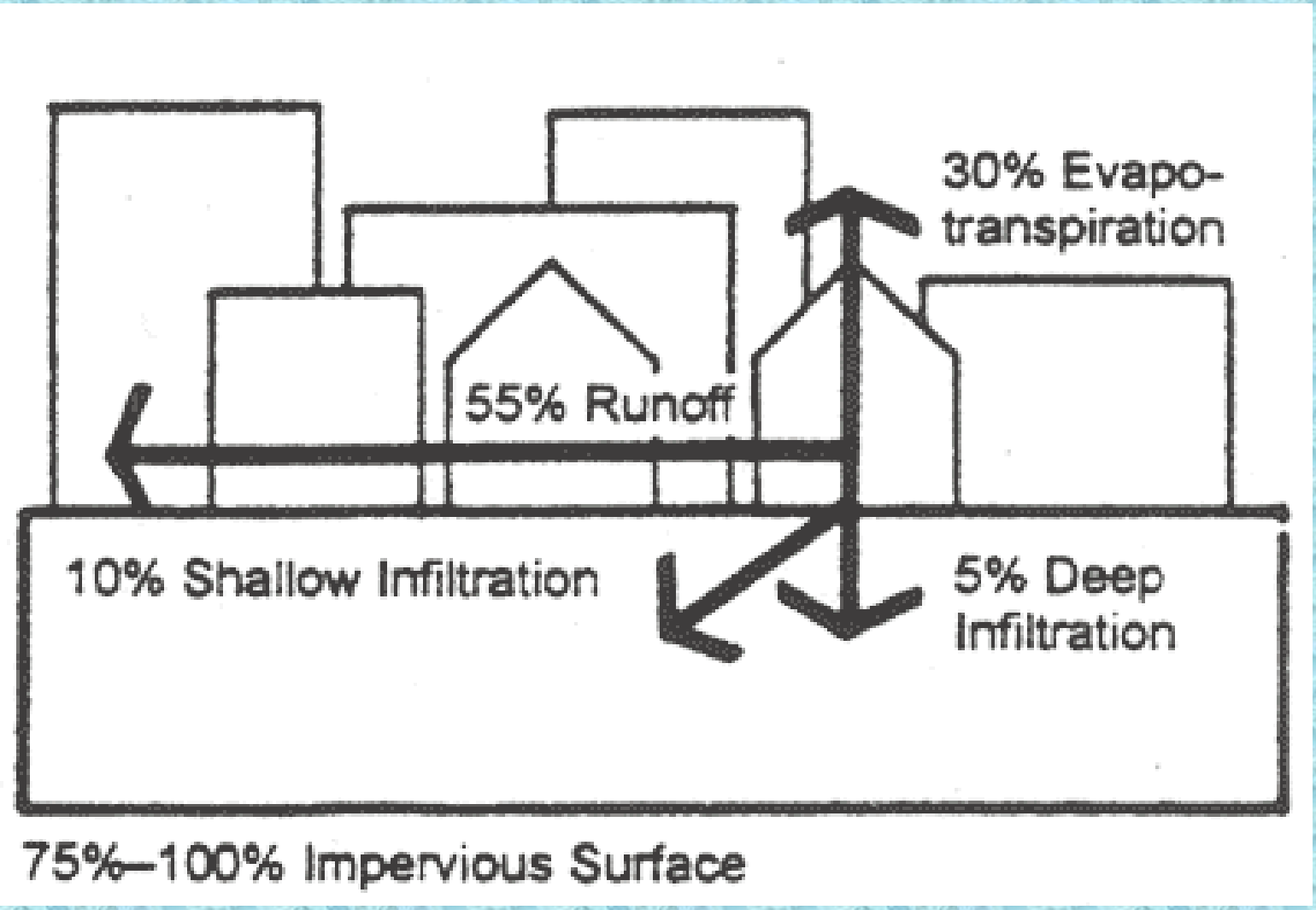
As an area begins to be developed, and impervious surfaces such as driveways and concrete drainage ditches are added, runoff increases dramatically …



… development continues, and the corresponding increase in erosion-causing runoff increases with it …



… eventually reaching a level of runoff well over five times greater than is present in an undisturbed system.



Why is it important to implement Post Construction storm water controls?

- Runoff carries pollution from rooftops, cars, pets, lawn products, and every other release onto urban surfaces straight into storm drains, creeks and other surface water.
- Runoff carries sediment from poorly prepared lots or drainage ditches into surface water, and can cause increased erosion of creeks and waterways.

Therefore, the goal of Post Construction measures is to reduce and control runoff from completed projects, for the life of the project, to the Maximum Extent Practicable (MEP).

Urban Runoff Concerns

- Sediment
- Metals
  - (Cd, Cu, Hg, Ni, Pb, Zn)
- Hydrocarbons
  - (Petroleum products – PAH's, PCB's)
- Pesticides and Herbicides
  - (Diazinon, chlorpyrifos, DDT, dieldrin, dioxins)
- Pathogens
- Trash and Debris
- Hydro-modification creates an increased need for drainage channel maintenance.

(Hydro-modification means changes in runoff volume and timing)

What is Hydromodification?

Urbanization creates increases in peak flows that can cause:

- Flooding
- Bank failures
- Threats and/or damage to structures
- Loss of riparian habitat
- Creek erosion and downcutting

Post-Construction storm water controls are becoming more common, and more important.

Installation of Post Construction controls are being driven by regulations.

- NPDES
- CZARA
- State Water Quality Certification requirements
- CWA 303 (d) and TMDL’s

Municipal Storm Water Requirements

Permittees must implement controls to reduce the discharge of pollutants and sediment to the Maximum Extent Practicable (MEP).

Municipal Storm Water Requirements

Municipal agencies must require both public and private development projects to include **site planning and design techniques** to prevent and minimize impacts to water quality.

Each agency must require public and private development projects to include appropriate permanent storm water quality controls.

SUSMP:
LA RWQCB New Statewide MEP Standard for New Development Treatment Measures

- SUSMP: “Standard Urban Storm Water Mitigation Plan”
- State Water Board finds SUSMP the statewide MEP standard in its June 2000 Bellflower decision (Water Quality Order 2000-011)
- SUSMP will be incorporated as a minimum standard into new/reissued NPDES storm water permits

Key Features of New and Redevelopment Standard

Like existing requirements, but also:

- Requires treatment or infiltration of about 85% of average annual runoff *(flow basis also)*
- Specifies sites to which it applies: subdivisions of 10+ homes, parking lots of 25 spaces/5,000 square feet or more, re-development
- Requires downstream hydromodification erosion impacts be addressed
- Maintenance of treatment measures

What are the basics of Post Construction storm water management?

- Minimize impervious surfaces
- Minimize connections between impervious surfaces
- Maximize permeability, where safe for structures
- Incorporate appropriate storm water treatment controls (filtering, etc.) – sized appropriately

What are the basic philosophies of Post Construction storm water control?

- Start at the Source
- Be flexible, and adapt methods to achieve good results
- Do everything you can, wherever you can
- Integrate solutions
- Consider long term maintenance needs

Here are some examples of effective Post Construction stormwater treatment controls:

- Grassy swales
- Micro-ponding
- Extended detention basins
- Constructed wetlands
- In-ground boxes, such as filters and separators

Instead of concrete drainage, the developer here used a grassy swale and landscaping to treat runoff.

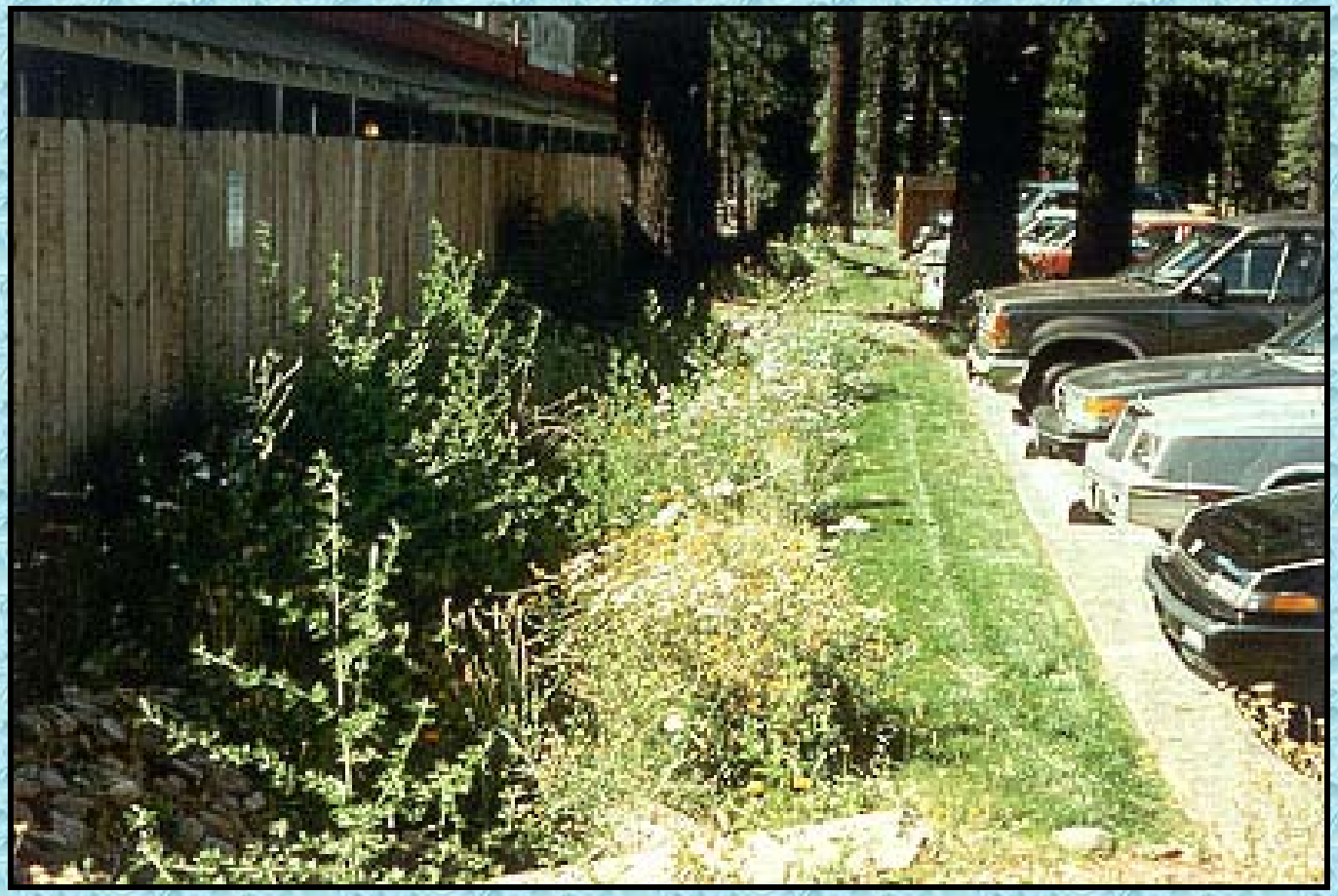
(Newark, CA – light industrial warehouse)

The gravel at the base of this structure handles roof runoff without using drains or gutters. The runoff infiltrates into the natural permeabile soil.

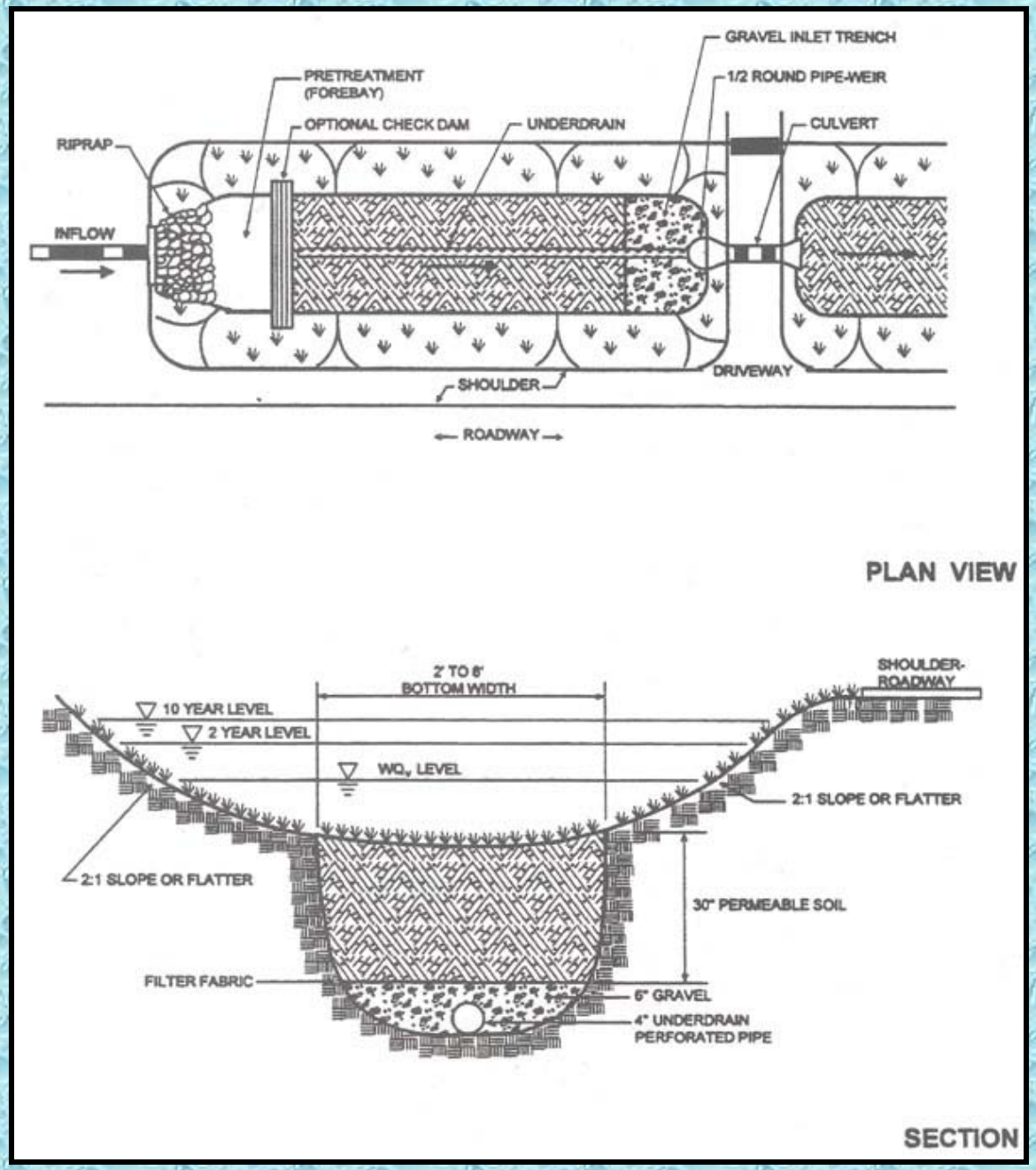
(Lake Tahoe, CA)

This permeable drainage system allows the runoff from this office building's parking lot to be reabsorbed into the ground, preventing pollution to surface water.

(Lake Tahoe, CA)

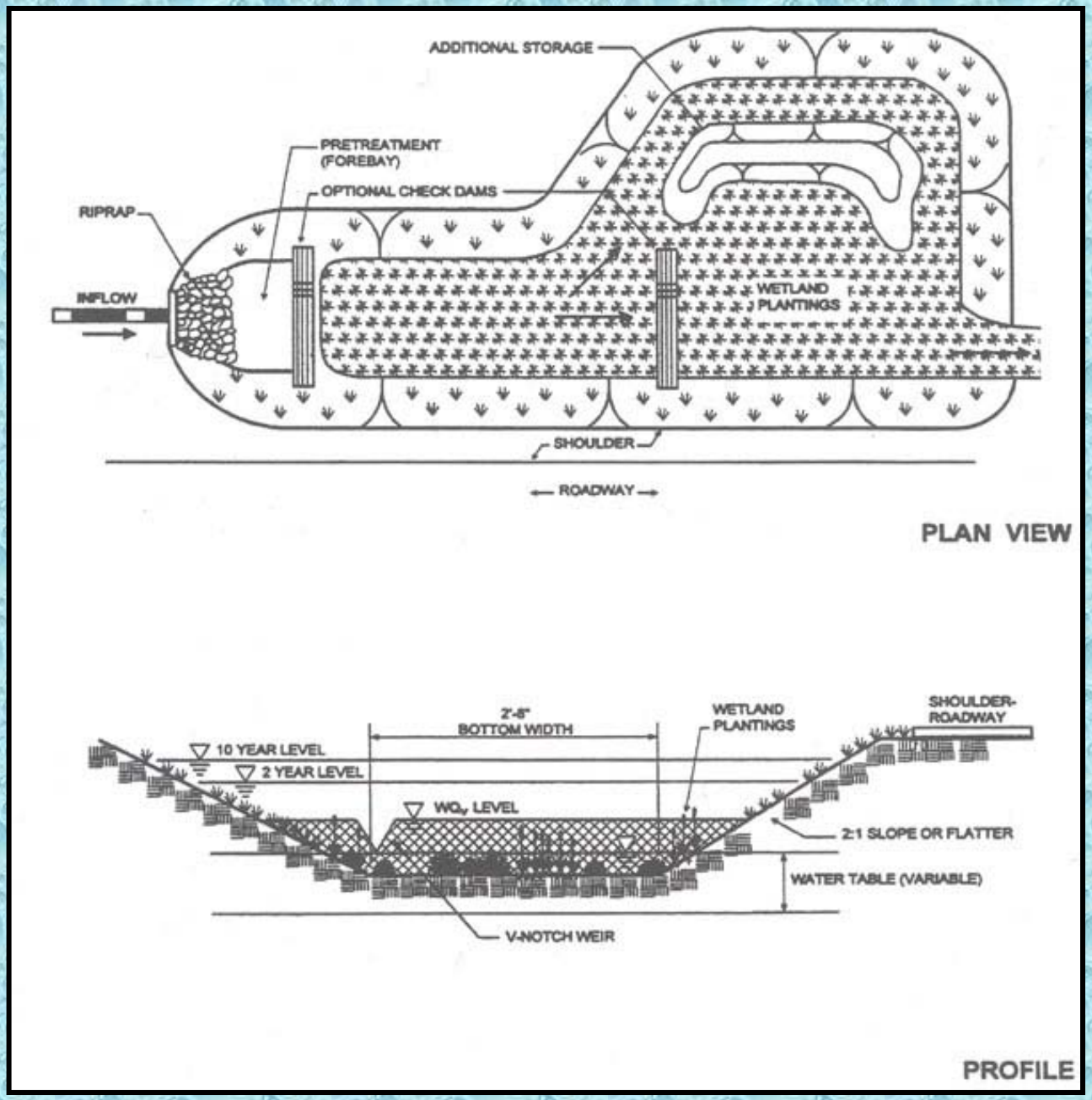


This is a design diagram for a dry swale. Dry swales are used in projects including low density residential projects, surface parking lots, and office parks.

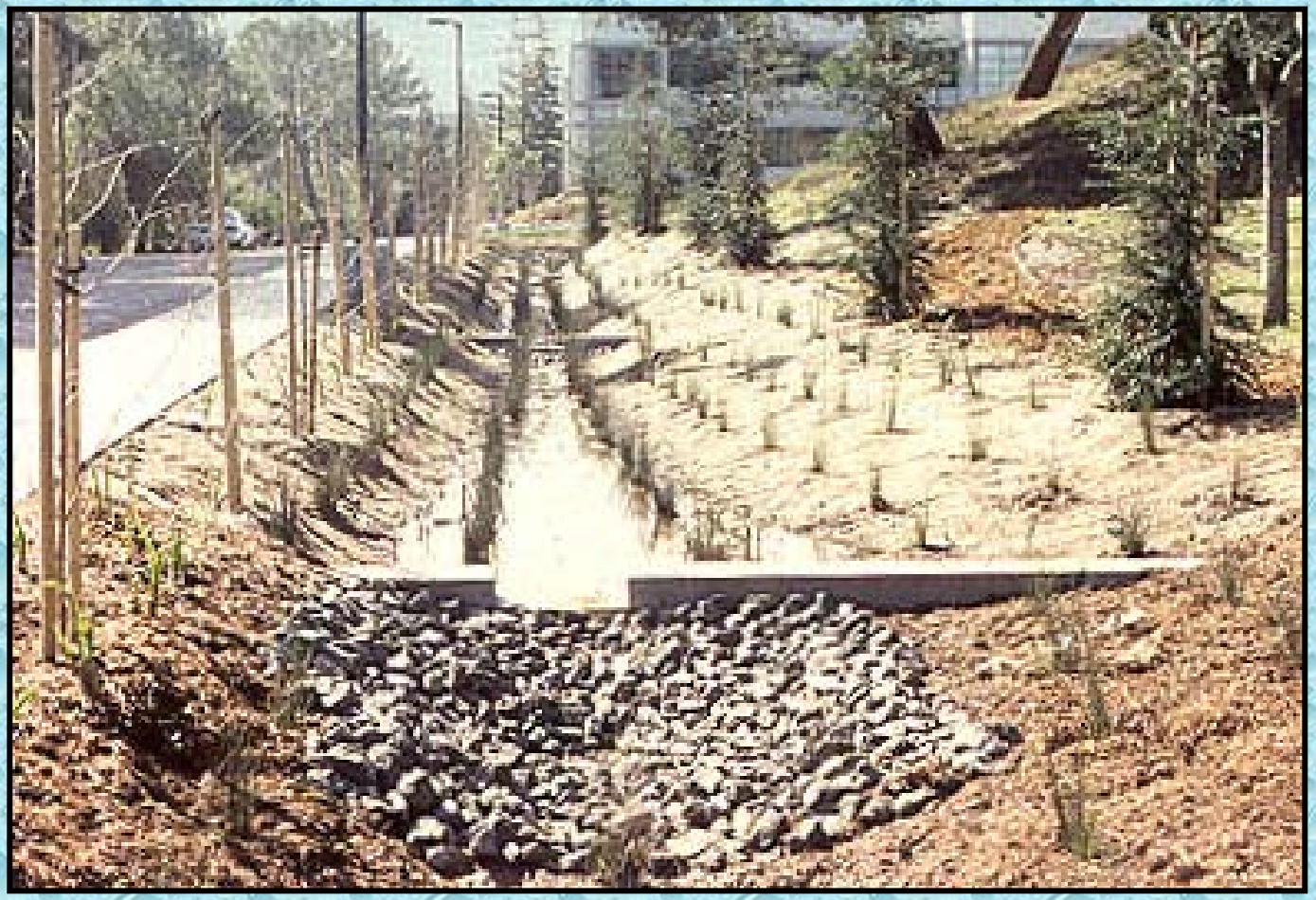


Here is an example of a dry grassy swale which reduces runoff and pollution.
(Newark, CA)

This is a design diagram for a wet swale. Wet swales are ideal for treating highway runoff in low-lying or flat terrain areas where water is nearly always present. If there is not enough water present, a dry swale can be used.



This is a wet vegetated swale with a permanent rock sediment filter and concrete checkdam (to increase sedimentation time!).
(Palo Alto, CA)



This grassy swale handles runoff from the nearby street in a much more environmentally friendly way than a concrete or bare earth drainage ditch would.
(Alameda, CA)

This porous parking lot is a good example of how to reduce runoff.
(Pacific Grove, CA)

Here is another type of porous parking lot.

(Shown prior to the final gravel application)

(River Forest, IL)

This gravel filtration system treats runoff so that pollutants are removed through soil media.

(Lake Tahoe, CA)

The perforated lateral runs lead to these concrete drop structures, which allow for convenient cleaning and maintenance.

(Lake Tahoe, CA)

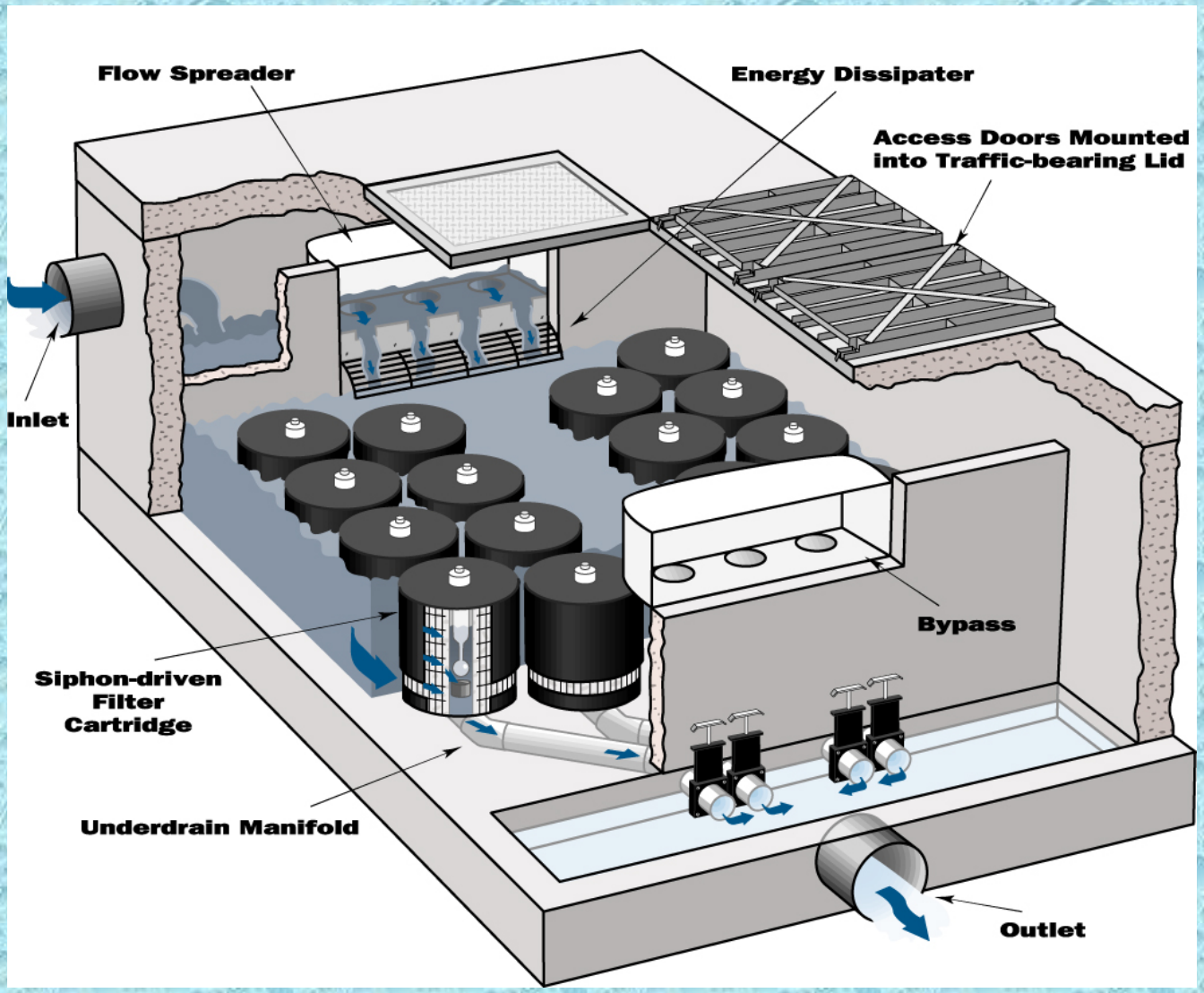
This detention basin is part of a surface storm drain system. It reduces flood flows and treats runoff at less cost than a standard piped storm drain system.
(Village Homes - Davis, CA)

This development is done in a neo-traditional way – notice the lack of unnecessary paving, sidewalks and curbs, narrower streets, and ample vegetation in the grassy swale on the left.
(Prairie Crossing – Grayslake, IL)

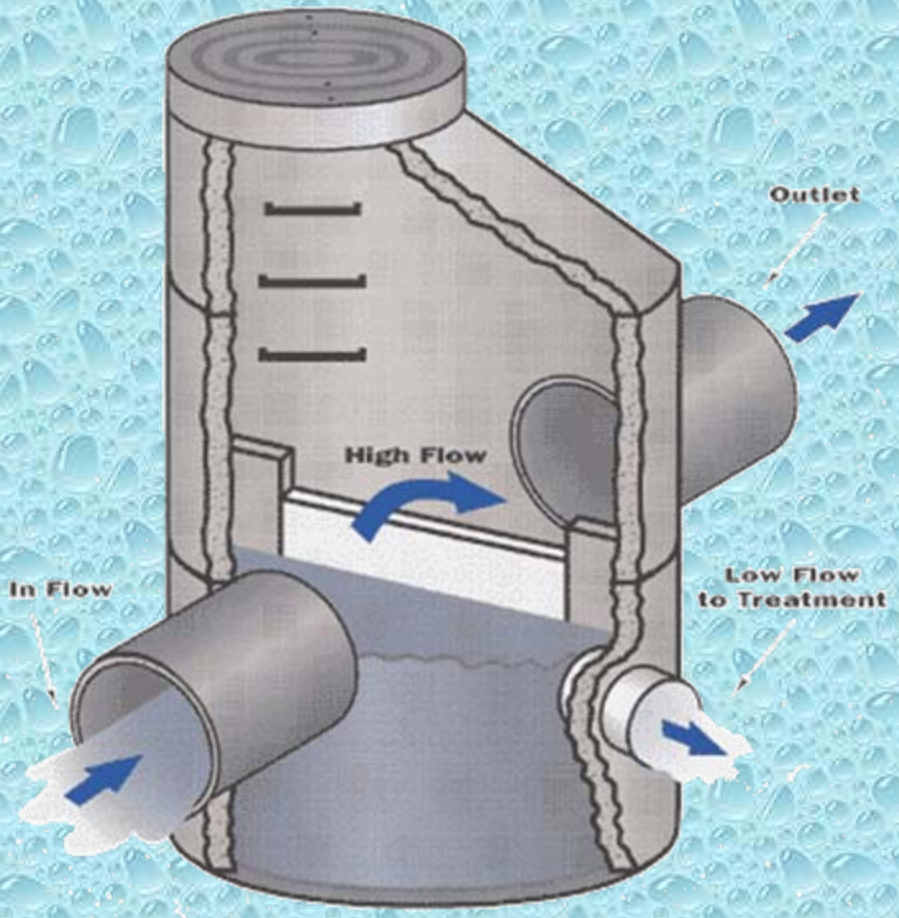
In many cases, preserving permeability and vegetation is not only cheaper, but is also aesthetically more pleasing than paving. This can also raise property value significantly.
(Palo Alto, CA)

Unit paving on a sand bed allows infiltration of some runoff and reduces pollutants.

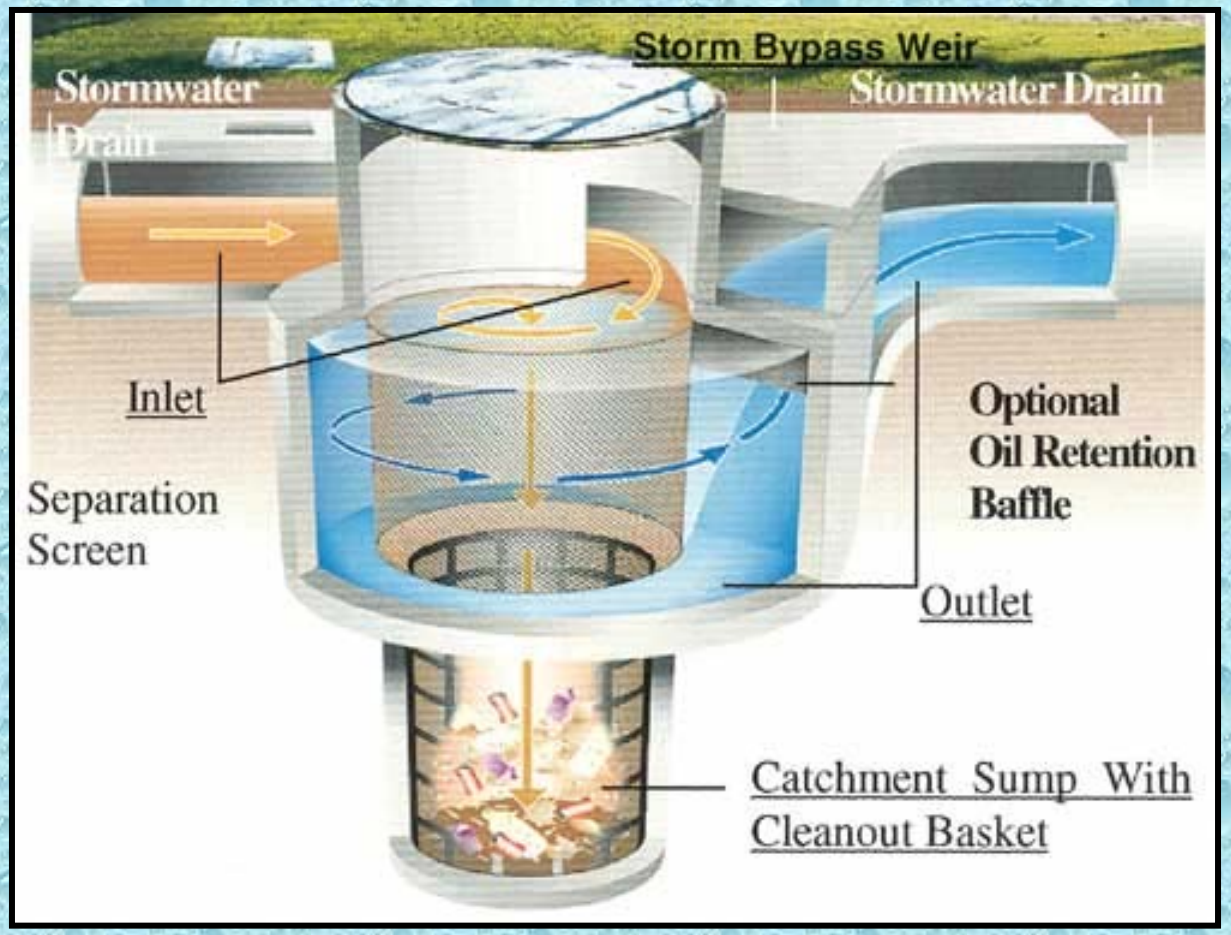
Permanent stormwater filtration systems like these can also be a good way to control pollutants in stormwater runoff.



Another type of permanent stormwater treatment unit.



Permanent storm water filtration systems like these (or any similar systems) require routine maintenance for maximum efficiency.



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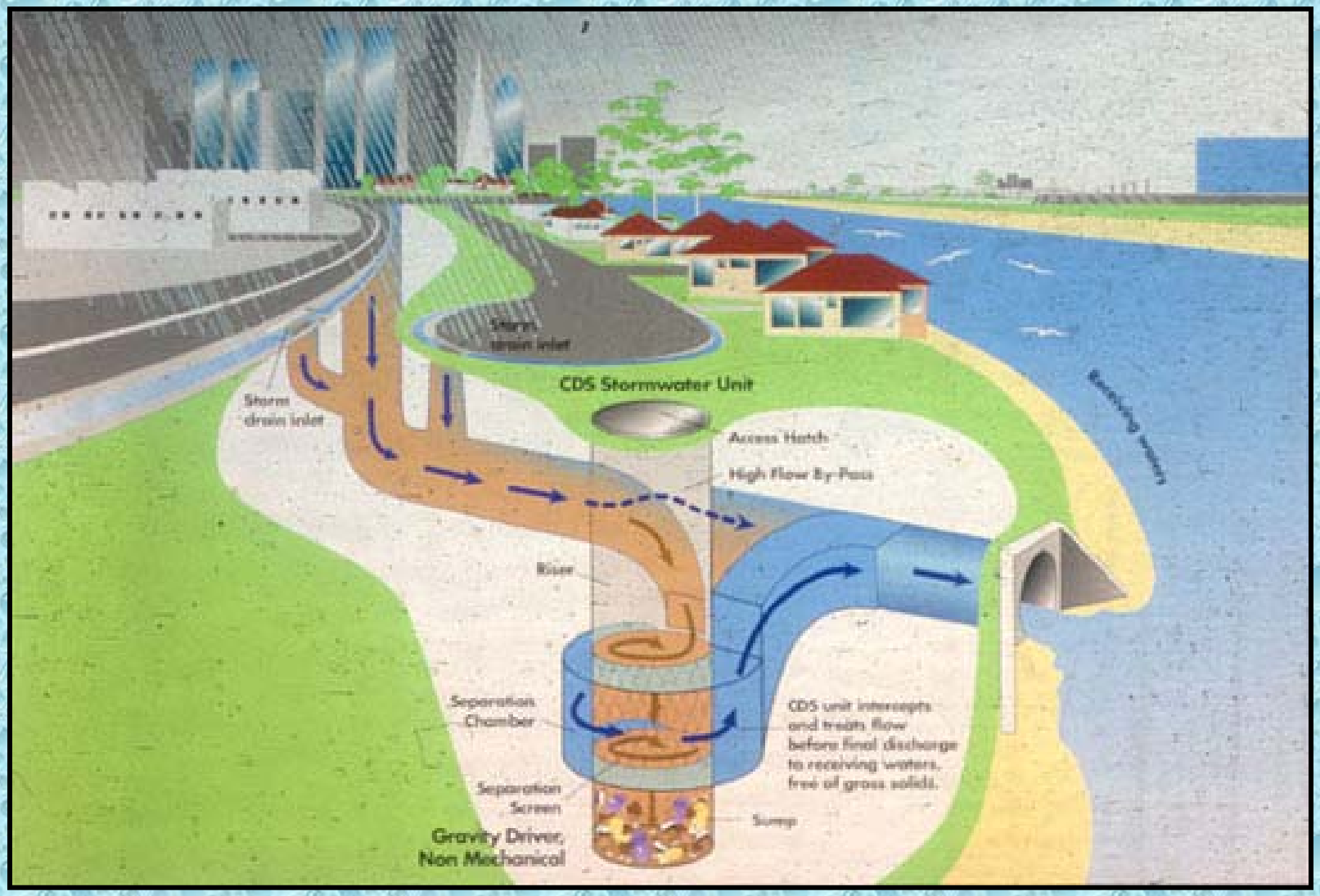

How much is enough?

- Treatment controls should be designed to appropriately treat 85% of the average annual runoff from a site.
- Design measures typically reduce the amount of runoff that must be treated, as well as the downstream impacts of hydro-modification.
- Successful project design is a combination of design measures and treatment controls.