

LID Parking Lots

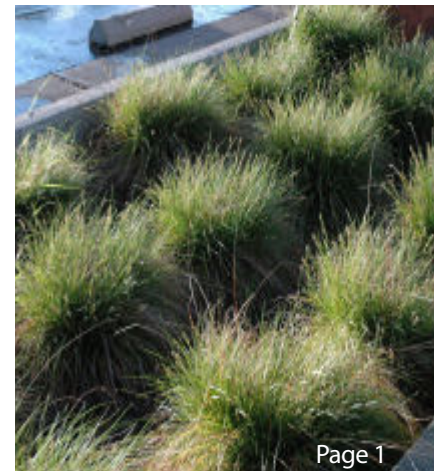
Low Impact Development

slow flow
reduce runoff
improve water quality

Before California was developed, the natural landscape, vegetation, and soils were virtually undisturbed. Under these pre-development conditions, as much as 50% of rainwater was infiltrated into the soil replenishing groundwater supplies, contributing to stream flows and sustaining vegetation; another 40% was released into the atmosphere through evapotranspiration. Only about 10% of rainwater contributed to stormwater runoff (rainwater that flows over the land surface). Today, our urban landscape has more impervious surfaces (hard surfaces that do not allow water to pass through) such as roofs, streets, sidewalks and parking areas. The increase in impervious surfaces has caused the amount and rate of stormwater runoff to be greater than pre-development conditions. These increased stormwater flows can cause flooding, road damage and erosion to natural streams and rivers. Runoff also carries pollutants from the surrounding watershed such as pesticides, bacteria, oils, metals and sediments that can make waters unsafe for recreational use and wildlife.

One of the ways to reduce the negative impacts of stormwater runoff is to change the way we approach development. The use of Low Impact Development (LID) strategies can help to protect and enhance the environmental quality of our rivers, creeks and watersheds. LID is a site design approach that uses techniques to slow and infiltrate stormwater, mimicking the natural, pre-development hydrology. LID design strategies can be applied to most new or redevelopment projects to meet stormwater regulations, reduce downstream flooding and protect natural resources.

This Technical Assistance Memo (TAM) provides guidance for designing LID or “green” parking lots. The amount of impervious surface and heavy automobile use associated with parking lots makes them a significant source of stormwater runoff and pollutants. Incorporating LID strategies into new or retrofit parking lots supports our community and environment.



Source: City of Paso Robles, Salinas River Aerial

Photo by: Kevin Penny, Bureau of Environmental Services, City of Portland

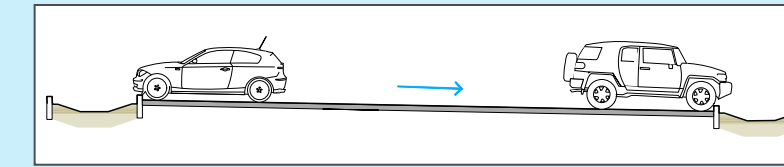
Anatomy of a LID Parking Lot

The design of a LID parking lot begins with a thorough site analysis taking into consideration existing conditions such as soils, site grades and mature trees. Using this information, LID parking lot design emphasizes an efficient layout to minimize impervious surfaces and uses site grading to direct runoff to landscaped areas where LID strategies can be utilized. It is important to integrate LID early in the project planning process to achieve the most cost effective design. Also, applicants should coordinate with their city planning staff to integrate the LID design with a project's development application. After project construction, regular maintenance of LID features is crucial for long-term performance and aesthetics. For further information related LID design and maintenance requirements, see the Resources section on the back page of this TAM.

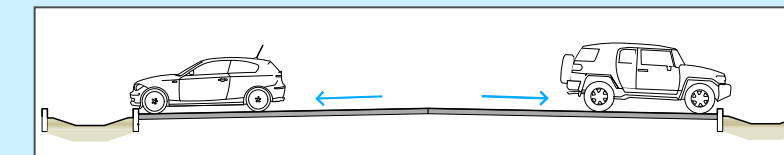


Design Strategy: Site Design

Grading and drainage for LID parking lots directs runoff to bioretention and pervious pavement areas. When designing large parking lots, it is best to break up and direct flows to multiple LID features. During the grading process, care should be taken to avoid compaction of areas identified for bioretention areas.

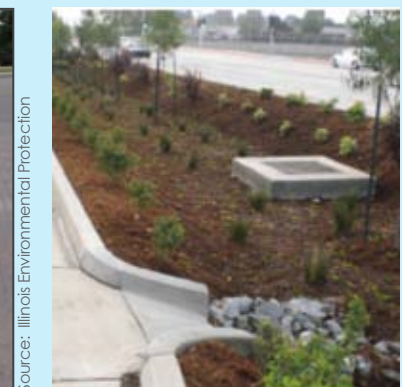


Continuous cross slope conveys the full aisle to an adjacent swale.



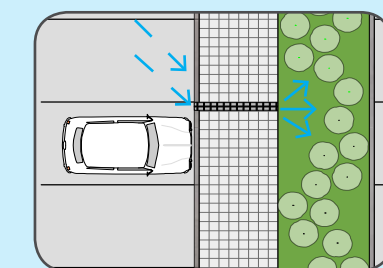
Crowned slope conveys half of each aisle to the adjacent swale.

Inlets and outlets direct runoff into, and out of, bioretention areas. Proper placement of inlets helps to spread runoff over the bioretention planting areas, which slows the flow and reduces erosion. Outlet, including overflow, structures direct excess runoff to the storm drain system or street. During construction, avoid placing overflow structures flush with the soil, which prevents the desired retention of stormwater in the bioretention area.



A curb cut inlet directs stormwater runoff into a biofiltration planter.

An overflow outlet conveys runoff that exceeds the bioretention area capacity.

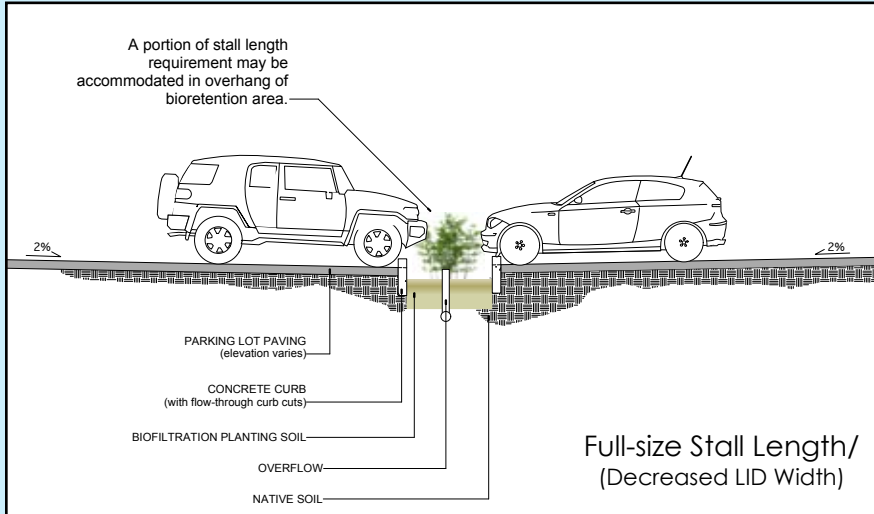


A patterned steel grate inlet conveys flow under a pedestrian walkway.

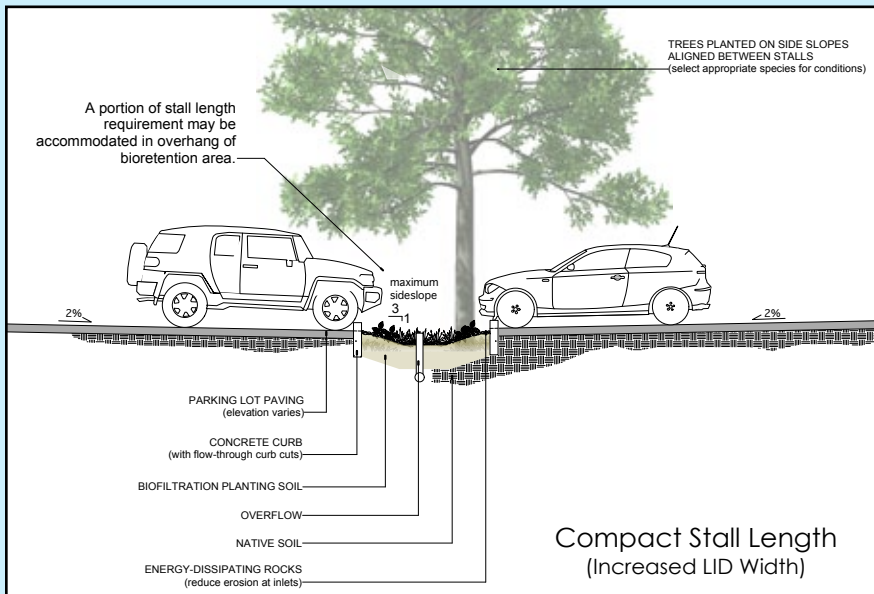


Photo Source: Kevin Peiry, Bureau of Environmental Services, City of Portland

Parking Configurations for LID parking lots can include the elimination of unneeded parking stalls and careful sizing and layout of planned stalls. Parking configurations can be adapted to meet both parking and stormwater management needs by sizing bioretention swales to fit with compact and full-sized parking stalls.



In this retrofit example, a narrow bioretention planting strip replaces pavement under the vehicle overhang space, accommodating full-size parking stalls. Some bioretention planting strips may be too narrow to include trees.



Considerations for tree placement in bioretention areas:

- Locate trees on side slopes, above areas that pond.
- Select trees that will tolerate seasonally wet soils.
- Do not specify trees with invasive roots.



This parking lot has both full and compact length stalls. The width of the bioretention area increases where parking stall size is decreased to compact.

Additional Resources

There is a wealth of information available on-line related to LID. The references below are good starting points for LID site planning and design.

- The Low Impact Development Manual for Southern California: Technical Guidance and Site Planning Strategies
<http://www.casqa.org/LID/tabid/186/Default.aspx>
- The California Stormwater Quality Association (CASQA) BMP Handbook for New Development and Redevelopment
<http://www.cabmphandbooks.com/>
- Contra Costa Clean Water Program (C3 Guidebook)
<http://www.cccleanwater.org/c3.html>
- City of Santa Barbara: Storm Water BMP Guidance Manual
http://www.santabarbaraca.gov/Resident/Major_Planning_Efforts/Storm_Water_Management_Program/



UC Davis LID Initiative



LEGAL DISCLAIMER: This Technical Assistance Memo (TAM) is intended as guidance only and should not be used as a substitute for site specific design and engineering. Applicants are responsible for compliance with all code and rule requirements, whether or not described in this TAM.