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
- 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/

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

Bioretention and pervious pavements are the most common LID features utilized for parking lot stormwater management. Bioretention facilities can be configured in nearly any shape and pervious pavements come in a variety of styles, colors, and finishes making them flexible ways to achieve the desired performance.

Bioretention systems: Planted areas designed to filter, store and infiltrate stormwater, utilizing mulch, soil and plant root systems, to retain, degrade and absorb pollutants. The use of an engineered soil mix and appropriate vegetation is crucial to performance. Generally, three feet of separation is required between the lowest elevation of the bioretention system and the seasonal high groundwater elevation. Where infiltration into underlying native soils is not appropriate, a perforated underdrain can convey treated runoff to a storm drain or surface drainage. Note that systems using perforated underdrains provide limited flow control. Bioretention areas may be stand-alone features, or linked in a treatment train.

Bioretention or stormwater planters: Small, contained bioretention areas where treated stormwater is infiltrated into the ground (Infiltration Planter) or, discharged to a traditional stormwater drainage system (Flow-Through Planter). Bioretention planters are flat bottomed with consistent soil depth and inundation across the planter. They are often used where space is limited.

Pervious pavement systems: Pavement comprised of a permeable surface with an underlying aggregate base course. Stormwater infiltrates through the surface and is either stored, or infiltrates where soils permit. For example, a 4-inch deep base course provides approximately 1.6 inches of rainfall storage. Pervious pavements installed over clay soils may require a deeper aggregate base and an underdrain system.

Pervious concrete: A mixture of course aggregate, portland cement, water and little to no sand results in concrete pavement with 15% to 25% void spaces, allowing stormwater to infiltrate at a rate of 200 – 400 inches/hour, depending upon fines included in the mix. The texture looks coarser than conventional concrete.

Pervious asphalt: An open graded asphalt concrete poured over a free draining aggregate base. It looks like traditional asphalt, but the fine grains have been screened and removed to achieve a void space of approximately 16%, allowing for stormwater infiltration.

Pervious pavers: Unit pavers that lock together to form a durable and stable driving surface. When installed over free draining bedding material, the sub-surface allows for water quality treatment, stormwater storage and infiltration, where soils permit.

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.