Design Your Site to Include Low Impact Development

What is Low Impact Development (LID)?

LID is a cost-effective and environmentally friendly approach to stormwater management and design. LID practices aim to imitate natural drainage patterns by minimizing impervious surfaces and utilizing a system of small-scale, decentralized treatment practices to infiltrate and/or evaporate runoff close to its source. LID reduces the environmental impacts of urban stormwater, such as excess flooding and decreased water quality of local waterbodies. LID also increases local aesthetics and is more cost effective than conventional stormwater management. There are numerous ways to design with LID, such as incorporating swales, rain gardens, or pervious pavement.

Rain gardens collect and filter runoff and can improve aesthetics

Why does UMass Boston (UMB) need LID?

Much of UMB's campus is covered by parking lots, roads and rooftops. Rainfall cannot soak through these impervious surfaces and instead flows quickly across them, carrying pollutants to Dorchester Bay, which suffers from excess bacteria and other water quality problems. LID techniques slow stormwater and encourage it to soak into the ground, where it can be filtered before reaching receiving waters. LID techniques also minimize impervious surfaces so less stormwater is generated in the first place. It is important that every UMB project aims to incorporate LID to mitigate stormwater pollution of Dorchester Bay, but also to help cost-effectively meet the requirements set by EPA in UMB's stormwater permit.

Permeable pavement reduces stormwater flows and pollutant loads

Pavement Disconnection: A Cost Effective Stormwater Treatment Strategy

Pavement disconnection is a cost effective LID practice that disconnects runoff from the drainage system by routing it to pervious surfaces to be treated via filtration and infiltration. When feasible, grade impervious areas to sheet flow to pervious areas, or design curb cuts that allow runoff to enter pervious areas.

Vegetated channels should be used in place of closed drainage when conditions allow

How to Implement LID

1. **Minimize pavement.**
   - » Design streets with the minimum width necessary to support travel lanes, on-street parking, and/or emergency vehicle access.
   - » Design parking lots with only as many stalls as needed. Reduce parking lot imperviousness by providing compact car spaces, minimizing stall dimensions, incorporating efficient parking lanes, and using pervious materials in spillover parking areas.
   - » Consider vertical parking structures, which can significantly reduce impervious cover and thus stormwater flows by reducing the amount of pervious area paved for parking. While expensive, these can be helpful on space-constrained sites.
2. **Conserve trees and other vegetation, and plant additional vegetation when possible.**
   - » Vegetation treats stormwater and decreases erosion in addition to providing many co-benefits.
3. **Whenever possible, utilize techniques that encourage infiltration close to the runoff source.**
   - » Infiltration is an extremely effective treatment technique, providing excellent volume and pollutant removal as well as groundwater recharge.
   - » Examples of LID infiltration practices include infiltration basins and swales, rain gardens, rain barrels, cisterns, permeable pavement, and pavement disconnection.
4. **If infiltration is not feasible, utilize techniques that filter runoff.**
   - » Examples include bioretention basins with underdrains, open channels, and sand filters.
5. **Use vegetated open channels in place of closed drainage where conditions allow.**
   - » Parking lots can be treated using filtration by removing curbing and designing linear features to surround the parking lot.
   - » Open channels provide treatment as they convey runoff and are more cost-effective than pipe systems.
   - » Consider density, topography, soils and slope to evaluate feasibility of open channels.
6. **Direct roof runoff to vegetated areas. Avoid routing rooftop runoff to the roadway or a closed drainage system.**

Consider UMB's Unique Site Constraints

- » Although infiltration is preferred for its superior water quality benefits, other practices may need to be utilized. Much of UMB's campus has shallow groundwater and/or poorly infiltrating soils, limiting the feasibility of infiltration practices.
- » Campus spaces are often used for multiple purposes (e.g., recreational areas, pedestrian traffic), requiring careful planning and design to incorporate LID without disrupting these functions.
- » LID design should harmonize with the campus's overall aesthetic.

Cisterns minimize discharge of roof runoff to the closed drainage system, and allow water reuse for irrigation or other functions

References

- » EPA Municipal Guide to Low Impact Development www.epa.gov
- » USDA Low Impact Development Fact Sheet www.nrcs.usda.gov
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- » Planners Web Putting the LID on Your Community's Stormwater www.plannersweb.com
- » Mass Audubon LID Fact Sheets www.massaudubon.org
- » Town of Ludlow Slow the Flow with Low Impact Development Practices www.ludlow.ma.us
- » Better Site Design: A Handbook for Changing Development Rules in Your Community https://mostcenter.umd.edu
- » West Virgina DEP Green Infrastructure and Low Impact Development www.dep.wv.gov