Low Impact Development (LID) Handbook

Hamilton, Massachusetts

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1.0 INTRODUCTION

1.1 What Is Low Impact Development (LID)?

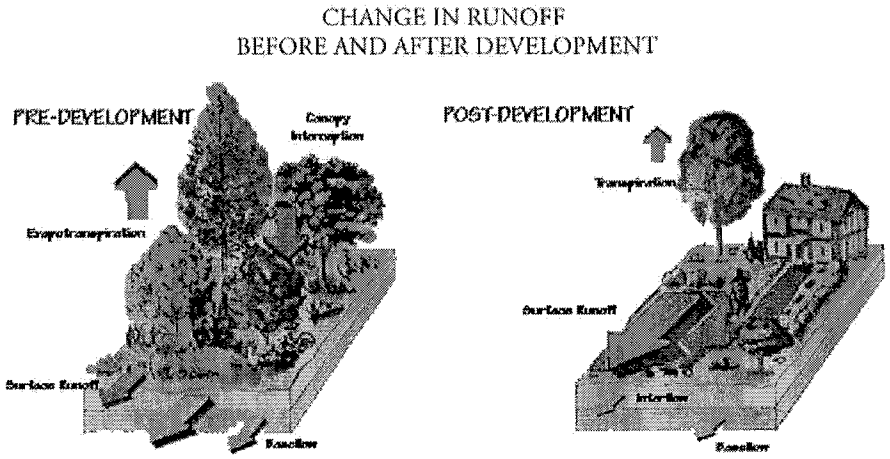
The term Low Impact Development (LID) refers to a variety of design techniques used in the planning of both residential and commercial developments. LID uses a variety of methods to:

- Reduce paved (impervious) areas,
- Distribute and diffuse stormwater runoff,
- Conserve natural habitats, and
- Provide groundwater recharge.

These techniques help reduce the amount of runoff that a site generates. LID management measures are encouraged to minimize reliance on structural management measures. The use of one or more site design measures by the applicant may allow for a reduction in the water quality treatment volume required and the stream channel protection volume required.

The design components that are evaluated as part of LID or better site design include street widths, street length, parking lots, rooftop runoff, and conservation of natural habitats. LID encourages minimization of impervious surfaces, protection of critical environmental resource areas, and preservation of naturally-vegetated buffers. Any reductions in impervious cover result in reduced stormwater runoff and, consequently, smaller land consumption areas and lower construction costs.

An example of low impact development is the reduction of individual lot sizes. Many residential neighborhoods are often designed using large uniformly shaped lots that use more land than necessary, and create more impervious cover and more turf, as shown in Figure 1. With LID, open space developments are encouraged. Open space developments can conserve existing natural areas by minimizing the amount of impervious cover and turf created while providing the same number of housing units. In addition, open space developments can preserve existing farmland and agricultural uses.



This diagram shows how development and its corresponding increase in impervious cover disrupts the natural water balance. In the post-development setting, the amount of water running off the site is dramatically increased.

Figure 1: Post Development Runoff Changes

The principles presented here are not strict guidelines For example, street width decisions should be balanced with maintenance access, safety, and economic issues. LID principles should fit in with the character of Hamilton to meet unique conditions in the community. LID guidelines act as benchmarks, but are not applied as cookie cutters and they must be consistent with environmental and watershed plans.

1.2 Methods to Minimize Impacts from Impervious Surfaces

When considering total impervious cover in the landscape, as much as 65% can be classified as "car habitat." Consequently, several of these principles address how to reduce car habitat in new developments, including streets, parking lots, and other structures designed for the car. Ways to minimize impervious surfaces include:

- Reducing
  - Required Road Widths;
  - Residential Street Lengths;
  - Paved Right of Ways;
  - Parking Lot Impervious Area;
- Minimizing cul-de-sac paving;
- Lowering Parking Space Ratios; and
- Using Natural Stormwater Treatment.

1.3 Low Impact Development Credits

In an effort to apply a unconventional approach to stormwater management, the Executive Office of Environmental Affairs (EOEA) developed five specific non-structural practices called LID credits, or incentives for better environmental site design, are provided for designers that will significantly reduce the size and cost of structural practices. The LID credit descriptions are included in Attachment A.

The five proposed non-structural LID credits are:

- Environmentally Sensitive Development
- Disconnection of Rooftop Runoff
- Disconnection of Non-Rooftop Runoff
- Stream Buffers
- Grass Channels

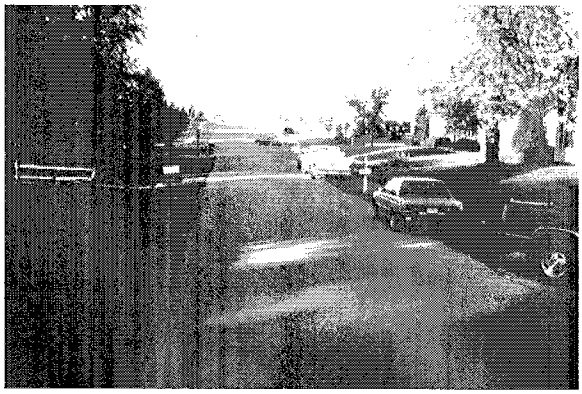
Non-structural practices are increasingly recognized as a critical feature of effective stormwater management, particularly with respect to site design. In most cases, non-structural practices will need to be combined with structural practices to meet stormwater requirements. The key benefit of non-structural practices is that they can reduce the generation of stormwater from the site. In addition, they can provide partial removal of many pollutants and contribute to groundwater recharge.

2.0 REDUCE RESIDENTIAL STREET WIDTH

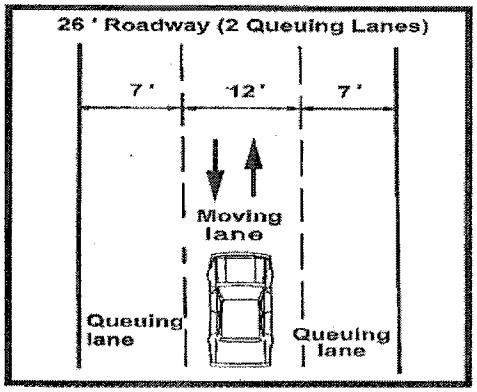
Excessively wide residential streets can often be attributed to blanket applications of high volume, high speed highway design criteria applied to local subdivision streets and a perception for the need for on-street parking on both sides and unobstructed access for emergency vehicles.

Instead, design residential streets for minimum pavement width needed to support travel lanes; on-street parking; emergency, maintenance, and service vehicle access. Street widths should be based on traffic volume.

Residential streets are often excessively wide, especially when blanket application of highway design criteria are used.

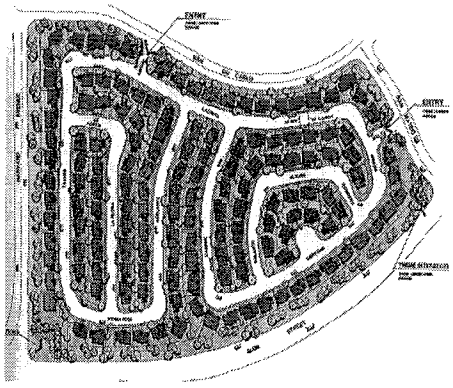


Narrow residential streets reduce traffic speeds, improve safety, provide sufficient access and parking, and reduce the amount of impervious cover created.



3.0 REDUCE RESIDENTIAL STREET LENGTH

Reducing the total street length constructed for new residential developments can be achieved by examining alternative layouts that increase the number of homes served per unit length of street.



Most communities do not explicitly require the shortest street network needed to serve individual lots on residential streets. It is generally assumed that the cost of constructing roads is sufficient incentive to assure short street networks. Streets are designed to accommodate rapid, smooth traffic flow, and consequently, total street length is rarely the most important design consideration.

While no particular street layout can guarantee a reduction in street length, some alternatives can help maximize the number of homes served per unit length.