UNDERSTANDING

Green Infrastructure In Zoning

PURPOSE

Measurable standards can be adopted within municipal zoning codes, and subdivision and stormwater regulations, to promote a comprehensive approach to Low Impact Development and the integration of green infrastructure in community development.

There are many opportunities within local zoning codes and subdivision and stormwater regulations to promote Low Impact Development (LID) standards and green infrastructure including the use of incentives, code requirements with standards, and a well-defined planning process that promotes coordination between preliminary plans, site plans, and stormwater management plans. Examples include incentives such as density bonuses, infiltration requirements with design standards, and planning for multipurpose functionality of design elements such as buffers and screening for landscaping and stormwater management. Rather than adopting a separate bylaw that may conflict with other sections of the zoning code, integrate green infrastructure throughout such that it becomes the norm not an exception.

Many green infrastructure strategies have multiple benefits and offer a more comprehensive approach for addressing a range of issues and challenges. For example, a green roof takes up no extra space at all, manages storm water by reducing peak flows, improves the heating and cooling efficiency of a building, and has the potential to be a source of food production. Techniques such as bioretention areas, grass filter strips, and swales can also meet landscaping and open space requirements while addressing stormwater treatment and infiltration.

Green Infrastructure

Communities are exploring strategies that promote capture and control of rain water near where it falls. This includes the use of natural or engineered systems – such as green roofs, rain gardens, or cisterns. In these facilities, stormwater can be cleansed as it moves through soils and plant roots (treatment), returned to groundwater (infiltration), returned to the air (evapotranspiration), and/or captured to irrigate plants or flush toilets (reuse). This approach is called "green infrastructure" because of the use of plants to enhance and/or mimic natural processes. Green infrastructure contrasts with traditional "gray infrastructure" which is typically built to capture and retain large volumes of stormwater collected over a large area, and convey it to the nearest waterway.

Source: Pioneer Valley Green Infrastructure Plan, February, 2014

AN EFFECTIVE PERMITTING PROCESS IS CRITICAL

Critical to effective implementation of green infrastructure facilities is the site inventory and analysis process which should occur before any design work. Existing site conditions may offer opportunities to minimize impacts as well as the costs of stormwater management and can be identified through careful site analysis. Local zoning and permitting can promote a thoughtful process by defining the planning process, and providing standards for green infrastructure.

Town of Franklin, Massachusetts – Best Development Practices Guidebook

Franklin, Massachusetts' commitment to expedited permitting resulted in creation of their Best Development Practices Guidebook to take the guess work out of permitting requirements for developers. Critical to smooth and successful permitting is their four step process for site plan and subdivision applications that begins with an existing site conditions map and an initial pre-development meeting, held every Wednesday at 3 PM, with representatives from all town boards, the police and fire departments, and Town Counsel. Developers are offered guidance on how to meet multiple permit requirements and community planning objectives with the least amount of time and expense. Through this process, LID and green infrastructure strategies are coordinated with other project requirements early in the planning process.

http://www.town.franklin.ma.us/Pages/FranklinMA_planning/initiatives/bestdevelopment.pdf

INTEGRATING GREEN INFRASTRUCTURE STANDARDS

Drainage

A best practice for eliminating conflicting standards is to reference the local stormwater bylaw or regulation within needed sections of the zoning code for appropriate drainage standards, thereby keeping all drainage standards and specifications in one section of the local code. All zoning standards for drainage should be consistent with the purpose and standards identified in any local stormwater management bylaw, regulation or policy to provide a seamless process for promoting LID site planning. Conserving the natural hydrologic function of a site, reducing impervious surfaces and preventing runoff are key principles in ensuring post development peak flows do not exceed predevelopment peak flows. Green infrastructure facilities should be explicitly encouraged for treatment, attenuation, and infiltration of stormwater at decentralized locations around a site to capture stormwater at its source.

Dimensional and Density Regulations

Explicitly allow bioretention areas, rain gardens, filter strips, swales, and constructed wetlands within required setback areas.

Allow reduction in frontage (and corresponding road length/paved area) where appropriate, such as in Open Space Residential Developments, at the outside sideline of curved streets, and around cul-de-sacs. Removal of all frontage requirements for open space developments allows greater flexibility for such projects.

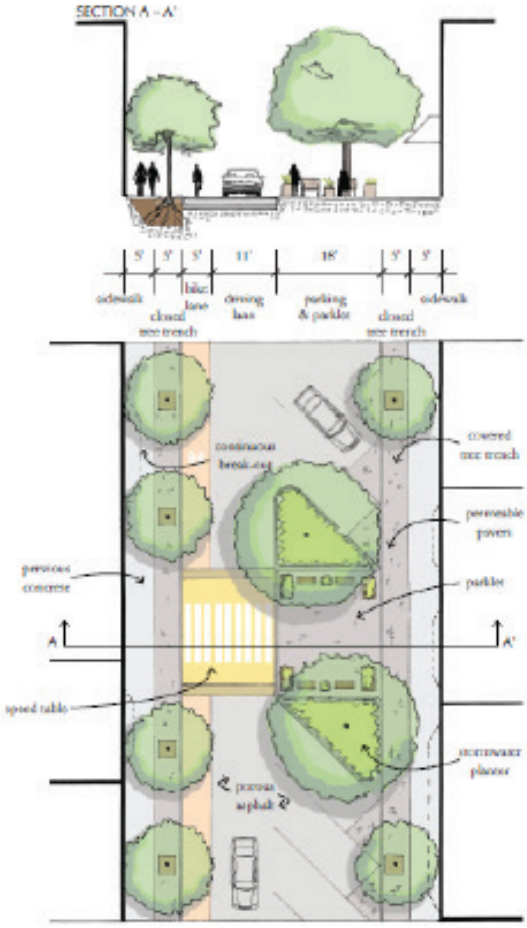
Setbacks for front, rear, and side yards should promote a walkable streetscape and support community character which means they will likely vary based on land use. In a mixed use district, setbacks should include enough space to comfortably design a pedestrian sidewalk against the building, a single lane automobile access lane or driveway, and a substantial vegetated buffer adjacent to the residential use as a screening buffer that can also serve as stormwater green infrastructure. A rear setback of 30-50 feet maybe required to ensure that loading, trash removal and other similar activities have adequate room. Flexibility in these standards due to lot configuration is important.

Site Preparation, Landscaping, Screening and Buffers

Landscaping requirements and objectives vary as a function of land use and activity. Emphasize native vegetation preservation on-site, and note that screening and buffer areas can be used for stormwater management provided that screening functions are not compromised. Consider including design standards for landscaping and screening that encourage the use of green infrastructure facilities. In the same way that architectural design standards serve a town, design standards for landscaping can support place-making within neighborhoods and across a community.

Roads

Roadways should be designed to be as narrow as possible while still wide enough to accommodate travel lanes, regular on-street parking (where required), and the passage of emergency vehicles, school buses, and the occasional delivery truck. Many local standards will specify that local urban roads be paved to a width of between 28 and 32 feet, while local rural roads might have a standard of only 22 feet in width. These guidelines are appropriate for high density development or higher vehicle volumes but are generally excessive for most suburban and rural developments. At a minimum, local codes and regulations should not discourage or prohibit impervious cover reductions. Curbs should be eliminated wherever possible to allow road drainage into open channel systems or other green infrastructure facilities. Requirements for curb and gutter infrastructure (i.e. requirements for new subdivisions to connect to storm sewer infrastructure) can be replaced with requirements for" perforated curb and swale" infrastructure, or simply roads without curbs where appropriate.



In thriving commercial areas, shaded pedestrian seating areas and calmed vehicular traffic invite people out in the neighborhood. Covered tree trenches manage stormwater and landscape pedestrian paths between the sidewalk and road, guiding circulation in the commercial district.
SOURCE: Holyoke Green Streets Guidebook, 2014

Landscaping and street standards can work well together to support community development objectives such as an improved pedestrian experience with a downtown commercial shopping district as illustrated in the City of Holyoke's Green Streets Guidebook (2014) image herein.

Example Road Travel Widths for Local Streets

Minimum Road	Parking	Average Daily Trips (ADT)	Number of Dwelling Units Served
20	Parking on both sides*	<200	20
22	Parking on one side*	200-400	20-40
26	Parking on both sides	400-2,000	40-200
28	Parking on one side	>2,000	>200
32	Parking on both sides	>2,000	>200

*Parking is restricted to one side during a snow emergency. No parking is designated of road is a designated fire lane. Source: Rhode Island Low Impact Development Site Planning and Design Guidance Manual. Horsley Witten Group and RI DEP, March 2011.

The standard ROW width of between 50-60 feet can also be excessive in many situations. Wide ROWs require more clearing and grading, potentially changing the ecological function of a site and creating more expense. The ROW need only be wide enough to contain all of the cross sectional elements including sidewalks, utility easements, parking lanes, drainage features, and travel lanes which depend on the size, density and location of the development. More moderate standards for ROW construction may include a 44- to 50-foot ROW width for 26- to 30-foot wide local urban and suburban streets. In a rural setting, a 40-foot ROW for 22-foot wide local roads might be more appropriate.

Also in subdivisions, there are opportunities to reduce the required radius of a cul-de-sac (down to an outer road radius of 30 to 40 feet), and to allow hammerhead turnarounds. On dead end streets, hammerhead turnarounds can provide a feasible way to reduce paved area while providing sufficient turnaround space for larger fire vehicles.

REDUCING IMPERVIOUS SURFACES IN PARKING REQUIREMENTS

Communities should establish both minimum and maximum parking ratios to provide adequate parking while reducing excess impervious coverage. Parking reductions could be allowed for factors such as: mixed land uses, access to alternative transportation, demographics, and utilization of Transportation Demand Management (TDM) Programs including subsidized mass transit and parking cash out programs. Flexibility is a key component to providing adequate but not excessive parking.

Off Street On-site Parking Requirements - Identify maximum parking spaces. Consider requiring a Special Permit for an increase in maximum parking allowance. Some on-site parking requirements could be met off-site particularly in redevelopment sites and compact mixed use centers.

Shared Parking and Other Opportunities to Reduce Parking Requirements – Establish formulas for the utilization of shared parking for uses with different peak demand periods (e.g. work day peak demand period 9am-5pm; housing peak demand period 6pm-8am). Provide a model shared parking agreement and facilitate implementation. An alternative to shared parking is increasing the number of zoning districts that have minimal parking requirements.

Parking and Loading Space Standards - Allow for smaller stalls for compact cars, up to 30% of total parking spaces. Allow pervious pavement driveways and parking stalls, soils permitting, in all zoning districts. Encourage pervious pavement in overflow parking areas and shoulders. Snow storage should not coincide with these areas as it may include sand which will clog pervious pavement and prevent infiltration. This is especially important if porous pavement is being utilized for stormwater management. Edging and curbing can be eliminated or perforated to allow stormwater flows into infiltration and bioretention areas. For larger parking lots, require separating parking rows with planting strips that may function to manage stormwater and shade the lot reducing the heat island effect. Shade tree requirements in planting strips should also take into consideration stormwater treatment.

On-Street Parking Demand - Wider residential streets are often justified by the need to provide on-street parking. However, providing a continuous parking lane on both sides of the street is usually an inefficient and expensive way to satisfy the required parking for residential areas, since most of the required parking per unit can be met in driveways or through shared parking. Consider using one or both of the on-street parking lanes as a traffic lane (i.e. a queuing street), both traffic movement and parking needs could be met with a narrower street.

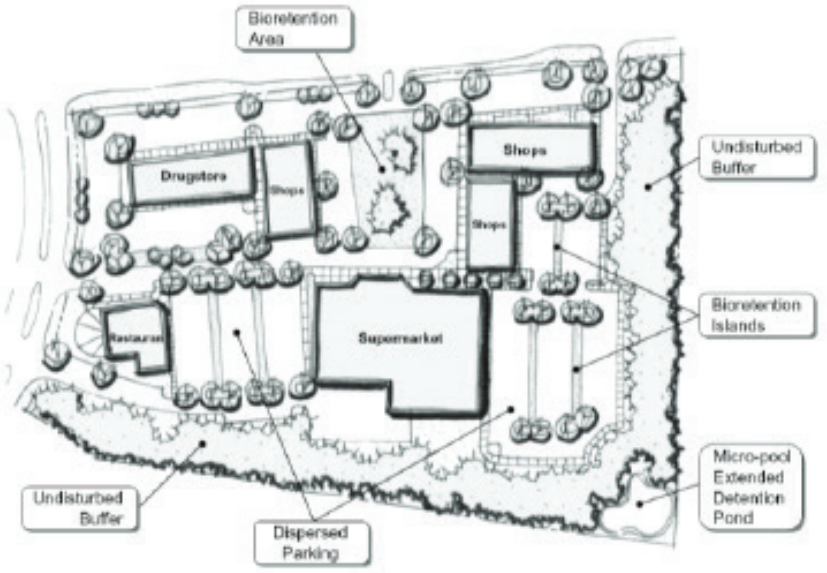
SIDEWALKS

Flexible design standards should be adopted that are based on safe pedestrian movement and limiting impervious cover. Constructing five-foot wide sidewalks on both sides of the street is not always appropriate, even in medium to high density developments. A three- or four-foot sidewalk on one side of the street is appropriate for many situations. Where practicable, sidewalks should be graded to drain into front lawns, reducing the total amount of runoff generated by the roadway. Consider permeable surfaces such as permeable asphalt or compacted aggregate where appropriate. Walkways may be removed from the roadway entirely and used to provide access to natural features or connect other destinations such as a playground, park or adjacent development.

The Town of South Hadley, Massachusetts allows subdivision developers to pay a fee in lieu of sidewalks in small developments where a sidewalk network may not serve a purpose. The fee contributes to bicycle and pedestrian projects in other areas of town.

OPEN SPACE PROTECTION IN ZONING

Open Space Residential Development (OSRD), Open Space Design (OSD), Conservation Development and Natural Resource Protection Zoning (NRPZ) are the current zoning models for what was previously called cluster or flexible development. This approach utilizes LID site design strategies for conserving natural hydrologic functions and reducing impervious surfaces for preventing runoff, integrating green infrastructure as a fundamental design element. These plans retain native vegetation and natural areas, and structure site layout to greatly reduce street infrastructure. The open space set aside should be based on resource values, not by formula such as X% of the development. The four step planning process reverses the typical subdivision planning process by first, designating open space based on an environmental analysis, siting houses next, layout of roads and trails, and last, lot lines are drawn.



This commercial shopping plaza set aside an undisturbed buffer and integrated green infrastructure facilities to reduce impervious coverage and provide a natural vegetated corridor around the site. Source: Rhode Island Low Impact Development Site Planning and Design Guidance Manual. Horsley Witten Group and RI DEP, March 2011.

REFERENCES AND RESOURCES

THE CONWAY SCHOOL. CITY OF HOLYOKE GREEN STREETS GUIDEBOOK. MARCH, 2014.

Mass Audubon's Shaping the Future of Your Community Outreach and Assistance Program

http://www.massaudubon.org/our-conservation-work/community-outreach/sustainable-planning-development/shaping-the-future-of-your-community-program/workshops/protecting-land-habitat

Massachusetts Smart Growth/Smart Energy Toolkit

http://www.mass.gov/envir/smart_growth_toolkit/pages/how-to-SG.html

RHODE ISLAND LOW IMPACT DEVELOPMENT SITE PLANNING AND DESIGN GUIDANCE MANUAL. HORSLEY WITTEN GROUP AND RI DEP, MARCH 2011.

www.dem.ri.gov/programs/bpoladm/suswshed/pdfs/lidplan.pdf

PIONEER VALLEY GREEN INFRASTRUCTURE PLAN, "TABLE 4.3 GREEN INFRASTRUCTURE DESIGN RESOURCES". PIONEER VALLEY PLANNING COMMISSION, FEBRUARY 2014.

www.pvpc.org/file/pvpc-green-infrastructure-plan-final-02-18-14pdf

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