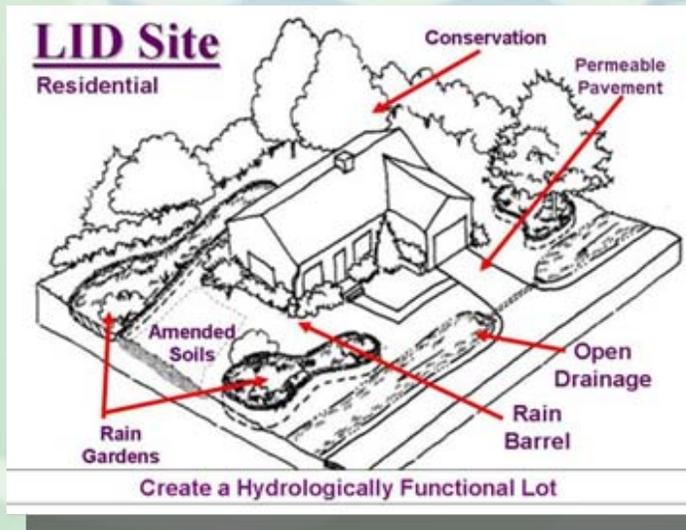


Rhode Island Stormwater Design and Installations Standards Manual



Public Workshop
LID Site Planning and
Design Strategies: How to
Meet Minimum Standard
No. 1

January 13, 2011

Low Impact Development (LID)

Community Planning



LID Site Design



LID BMPs

Larger Conventional BMPs



Receiving Waters



Low Impact Development (LID)

Traditional

LID

Site Design



BMPs



Minimum Standard No. 1

LID Site Planning and Design Strategies

- Must be used to the maximum extent practicable;
- Reduce runoff;
- Document compliance, and why elements not incorporated in Accordance with Checklist in Appendix A of Manual;
- Define what mitigation is offered.

Avoid the Impacts

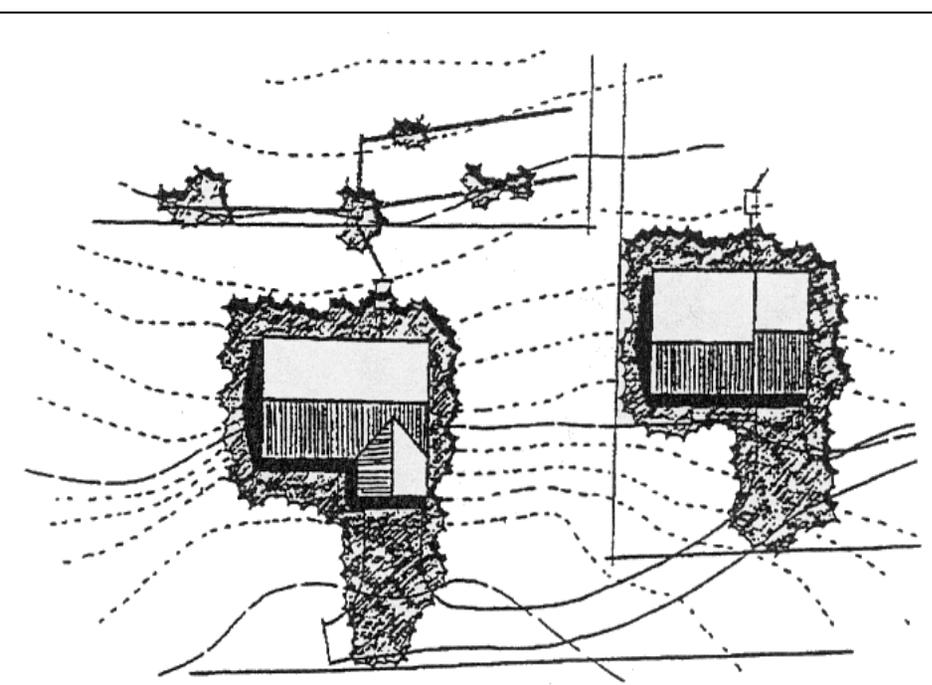
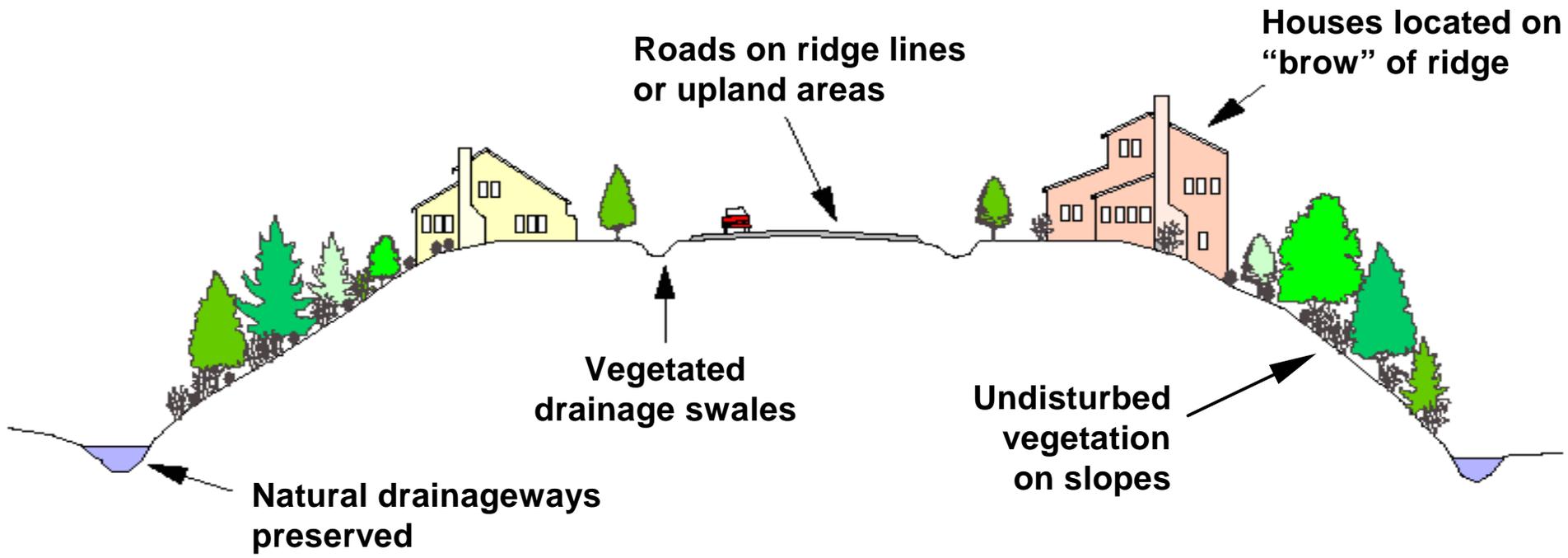
Preservation of Natural Features & Compact Development

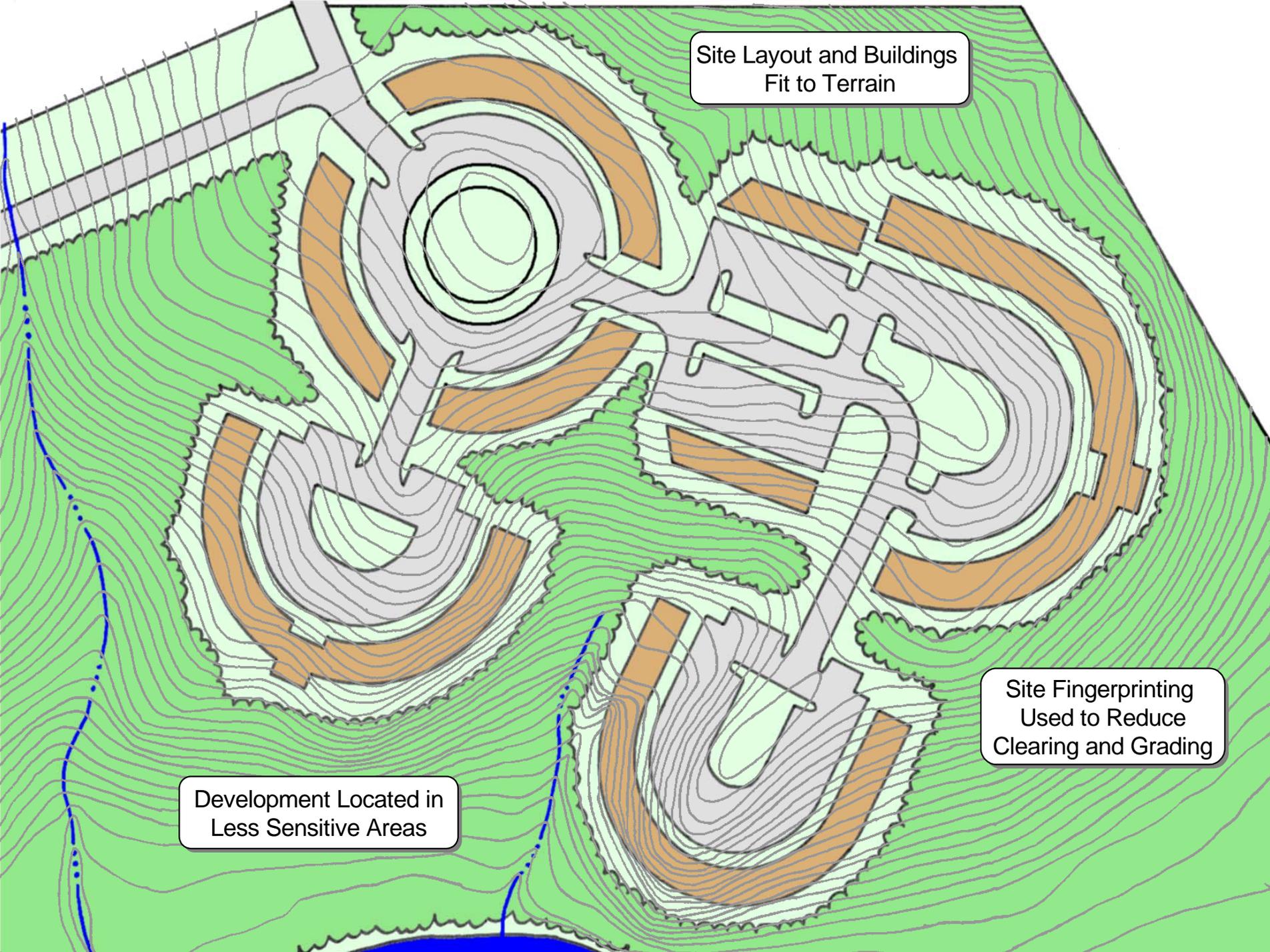
- Preservation of undisturbed areas;
- Preservation of buffers, natural drainage systems;
- Reduction of clearing and grading;
- Locating sites in less sensitive areas;
- Compact development; and
- Working with natural conditions (landscape, hydrology, soils)











Site Layout and Buildings
Fit to Terrain

Development Located in
Less Sensitive Areas

Site Fingerprinting
Used to Reduce
Clearing and Grading



Buffers and Stormwater



Reduce the Impacts

Reduction of Impervious Cover

- Roadway Reduction;
- Sidewalk Reduction;
- Driveway Reduction;
- Cul-de-sac Reduction;
- Building Footprint Reduction; and
- Parking Reduction.

Which of these is not LID?



Which of these is not LID?



Which is not considered LID?



Which of these is not LID?

A



B



C



D



Which of these is not LID?



Manage the Impacts

Source Controls/Structural Controls

- Disconnection of Impervious surfaces;
- Mitigation of runoff*;
- Stream restoration; and
- Reforestation.

*Practices that rely on natural systems (e.g., bioretention, WVTS, infiltration, filtering)

Rain Gardens



Impervious Cover Disconnection

Mild vegetated slopes

Adjacent to small parking lots
and roadways



Source: City of Portland, OR



Source: City of Portland, OR

Which is not considered LID?



Rain Barrels and Cisterns



Green/blue Roofs



Green/blue Roofs



Stream Restoration



Stream Daylighting



Reforestation



Street Trees



LID Stormwater Credits

LID Site Design Credit:

Disconnected Rooftop Runoff

Disconnected Non-Rooftop Runoff

Credit can be used to reduce or eliminate Re_v and WQ_v storage requirements.

LID Stormwater Credits

- Still need to meet other Standards;
- Must maintain engineering “standard of care” and “good drainage design;”
- Direct runoff **over qualifying pervious areas (QPAs)**; and
- LUHPPL runoff not eligible for credit.

Qualifying Pervious Areas (QPA)

- Natural or landscaped vegetated areas;
- Fully stabilized;
- CNs based on “good hydrologic conditions;”
- Must be shown on site plans;
- Must have 4 inches of topsoil and located outside regulated wetlands and buffer zones; and
- Excessively fertilized lawn areas are not QPAs (must be planted with low maintenance grasses adapted to NE).







Credit Restrictions

- Qualifying Pervious Area (QPA) located 10 ft from bldg foundation;
- Every **1,000 sq ft** of impervious area must have at least **75 linear feet** pervious sheet flow and be longer than the contributing flow length; and
- Can be no overlap for QPA (i.e., can't direct 2 different areas to the same QPA);



Credit Restrictions

(Continued)



- Lots > 6,000 ft² for rooftops;
- Slope of QPA < 5.0%;
- QPAs located over A or B soils;
- No construction traffic over QPA;
- O&M Plan required;
- QPA cannot be a wetland resource; and
- QPA must be controlled by the owner/applicant



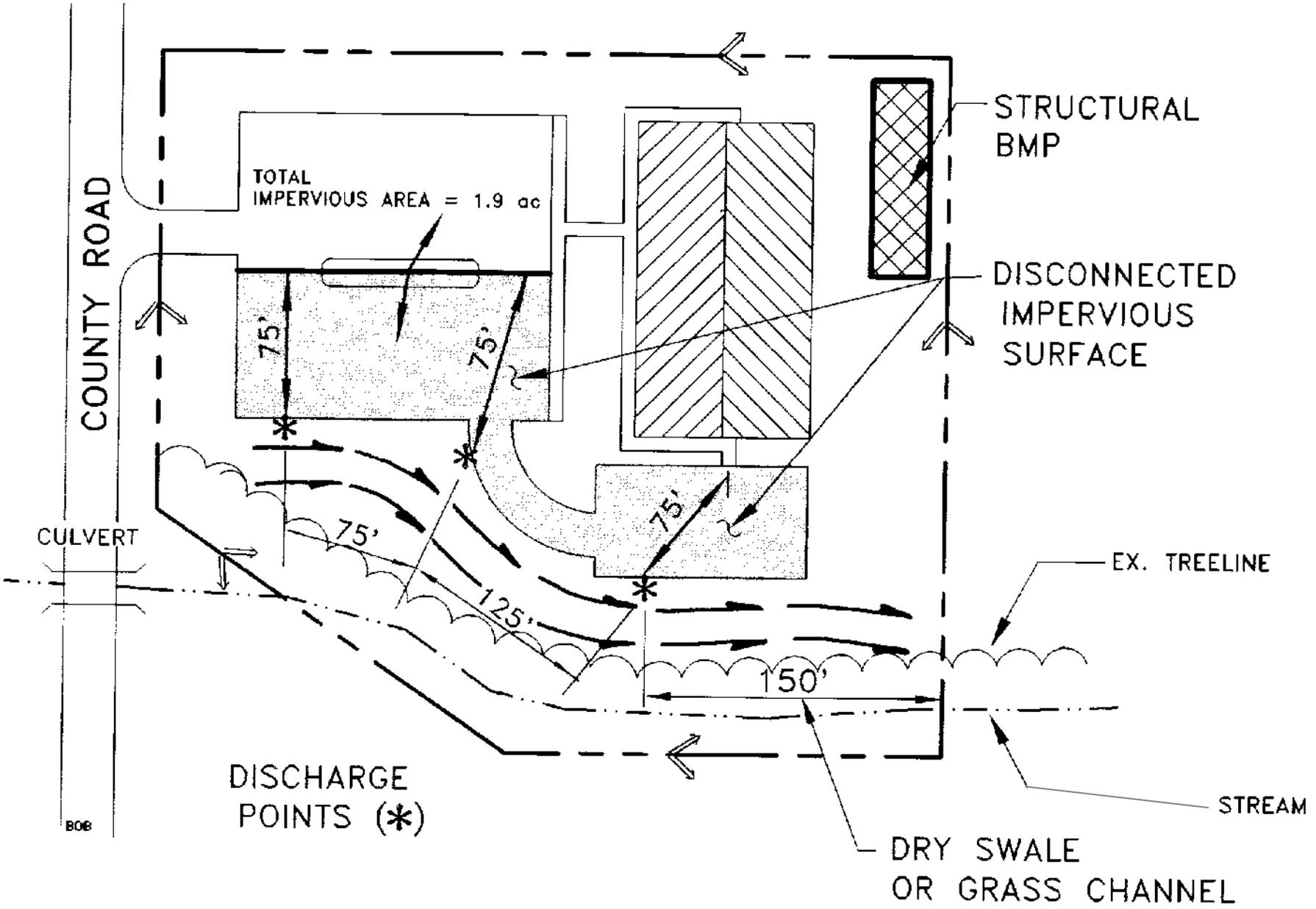
Stormwater Credit (Recharge; Re_v)

- Two Methods:
 - Percent Volume - storage provided based on volume required for Re_v and/or WQ_v
 - Percent Area (Re_a) - required impervious area to drain to a QPA based on:

$Re_a = (F)(I)$, where

F = Recharge Factor based on soils
(dimensionless)

I = Impervious area (in acres or ft^2)



LID Summary

Traditional controls

- Goal: Get the water out of here as fast as possible;
- Collect and store in big, “hole in ground” off-site;
- Pipe discharge to a stream or wetland;
- Limited water quality treatment and infiltration;
- Stormwater is a waste product.

LID controls

- Goal: Reduce the amount of surface runoff by reducing impervious cover and preserving natural areas;
- Rely on small, distributed on-site practices;
- Infiltrate or reuse as much as possible; filter before discharge;
- Source controls to minimize pollution;
- Stormwater is a resource.



Summary (cont'd)

Traditional Design

- Mass clearing and grading
 - Loss of trees
 - Compaction of native soils
- Residential
 - Wide streets and cul-de-sacs
 - Sidewalks to nowhere
 - Lots of turf
 - Curb and gutter
 - Ponds
- Non-residential
 - Big parking lots
 - Minimum parking ratios
 - Large stall dimensions

LID

- Site fingerprinting
 - Preserve natural areas
 - Retain key pervious areas
- Residential
 - Narrow streets
 - Alternative turnarounds
 - Smart sidewalks
 - Shared driveways
 - Reduced setbacks
 - Open section roads
 - Downspout disconnection
- Non-residential
 - Pervious spillover parking
 - Maximum parking ratios
 - Shared parking
 - Reduced stall dimensions



LID Strategies and Associated Methods

Appendix A Checklist

Avoid the Impacts

(continued)

- Locating Sites in Less Sensitive Areas
 - Conservation development process utilized, where allowed
 - Development located in areas with least hydrologic value
 - Development on steep slopes/ridges avoided

- Compact Development
 - Conservation development process utilized, where allowed
 - Reduced setbacks, frontages, and right-of-way widths

- Natural Landscape Conditions, Hydrology and Soils
 - Natural pre-development hydrology maintained
 - Post-development T_c = pre-development T_c .
 - Travel time is approximately constant
 - Flow velocity kept as low as possible
 - Soil compaction has been minimized
 - Grading (cut and fill quantities) minimized



Reduce the Impacts

- Reduction of Roadway Area
 - Lengths and widths minimized
- Reduction of Sidewalk Area
 - One side of the street
 - Pedestrian pathways integrated into site design
- Reduction of Driveway Area
 - Shared driveways
 - Alternative paving surfaces
 - Narrower widths

Reduce the Impacts

(continued)

- ❑ Reduction of Cul-de-Sac Area
 - Eliminate the use of large radii bulbs, fully paved
 - Alternative turn- arounds
 - Grid design
- ❑ Reduction of Building Footprint
 - Less sprawling building footprints
 - Multi-story commercial buildings
 - Mixed use development
- ❑ Reduction of Parking Lot Area
 - Parking ratio evaluated (maximum and minimum)
 - Size of spaces/stalls
 - Shared parking
 - Structured parking
 - Alternative paving surfaces for overflow parking



Manage the Impacts

- ❑ Disconnecting Impervious Area
 - Impervious surfaces disconnected to qualified pervious areas
- ❑ Mitigation Runoff
 - Roof runoff directed to a lower impact practice
 - A green roof has been designed to reduce runoff
- ❑ Stream Restoration
 - Natural channel design/stream channels restored
- ❑ Reforestation
 - Trees planted or conserved
 - Low maintenance landscaping and native vegetation