Low Impact Development Construction

Robb Lukes, PE
Credit Valley Conservation
Design, Construction, and Maintenance of LID Practices: Results from a Field Assessment in Virginia’s James River Watershed

Center for Watershed Protection 2008 Study

Why do LID Projects Fail?

- Plans without enough detail and instruction
- Designers who do not understand the complexities of construction
- Contractors who do not understand the technology or importance of certain procedures
- Lack of effective erosion and sediment control during construction
LID Construction Guide
Don’t Do what Donny Don’t Does

LID Construction Guide Chapters

- Siting & Verification of Design
- Tendering & Ownership
- Clearing & Grubbing
- Perimeter Control
- Mass Grading
- Utility Installation
- Buildings
- Finish Grading
- Materials
- Permeable Pavement
- Permanent Vegetation Establishment
- Overwintering
- Certification
- Avoiding Common Mistakes
Site Verification: geotech

Mass Grading: Cut & Fill

Infiltration grading for cut areas

Infiltration grading for fill areas
Rip underlying soils 30 cm to 50 cm deep to avoid soil stratification.
Locate Utilities
- Excavation Limits Marked

Utilities: avoiding surprises
Utilities: structural lighting support

protect infiltration areas
protect infiltration areas
protect infiltration areas

Off Line Design

RWG Full = Off line
Off Line Design

Off Line Design Decreases:
- Soil Scour
- Mulch Displacement
- Plant Damage
- And invasive weed establishment

Easy Stormwater Bypass During Construction
Inlets and Pre-treatment

Minimum Slope 12%

2” Drop

Top of Sod Use for Pre-Treatment

Typical Bioretention Cross Section

Not to Scale
Inlets and Pre-treatment

Rushmore St,
Burnsville, MN
Outlet Elevations

Materials: soils, soils, soils
Materials: soils, soils, soils

Image Source: LID Center
Materials: communicating the specification

Materials: Geotextile
The right geotextile for the right place

Materials: Mulch

Mulch (when required)
Shredded Hardwood Mulch (fibrous stands will mat together)
Why is Vegetation Important to LID?

Function

Public Acceptance

Pollutant Removal Mechanisms

- Chemical
  - Electrostatic / ion exchange within Humic / clays / silts
- Biological
  - Phytoremediation
  - Bioremediation
- Physical
  - Storing and cycling nutrients
  - Sedimentation
  - Filtration
  - Adsorption
  - Precipitation

- Plant uptake
- Plant metabolism
- Root absorption
- Biodegradation in the rhizosphere
- Stormwater contaminants
Native vs. Non-Native

Vegetation


Maximum Ponding Depth = 6 inches

# of Plants = 16 species

Plant Density = 1 plant per square foot

Vegetation


Designing and Installing for Maintenance

Three Components to Reducing Life Cycle Maintenance Costs

Inspection & Maintenance

Installation

Design
designing for the client

Image Source: LID Center
plant density and plant location

Image Source: LID Center

to seed, plug, or sod
Avoiding Common Mistakes

- Underground Utility Surprises
- Unforeseen Soil Conditions
- Excessive Soil Compaction
- Inexperienced Contractor (Bidding and Construction)
- Limited Details in Plan
- Proper Excavation Equipment and Technique
- Perimeter Fencing
- Construction Sequencing
- Finish Grading
- System Not Offline
- Severe Storm Events and Siltation
- Lack of Construction Supervision
- Lack of Installation Responsiveness

to seed, plug, or sod
Questions?

Downloadable from the CVC website:
http://www.creditvalleyca.ca/

Robb Lukes
Credit Valley Conservation
rlukes@creditvalleyca.ca