

LID

Maintenance

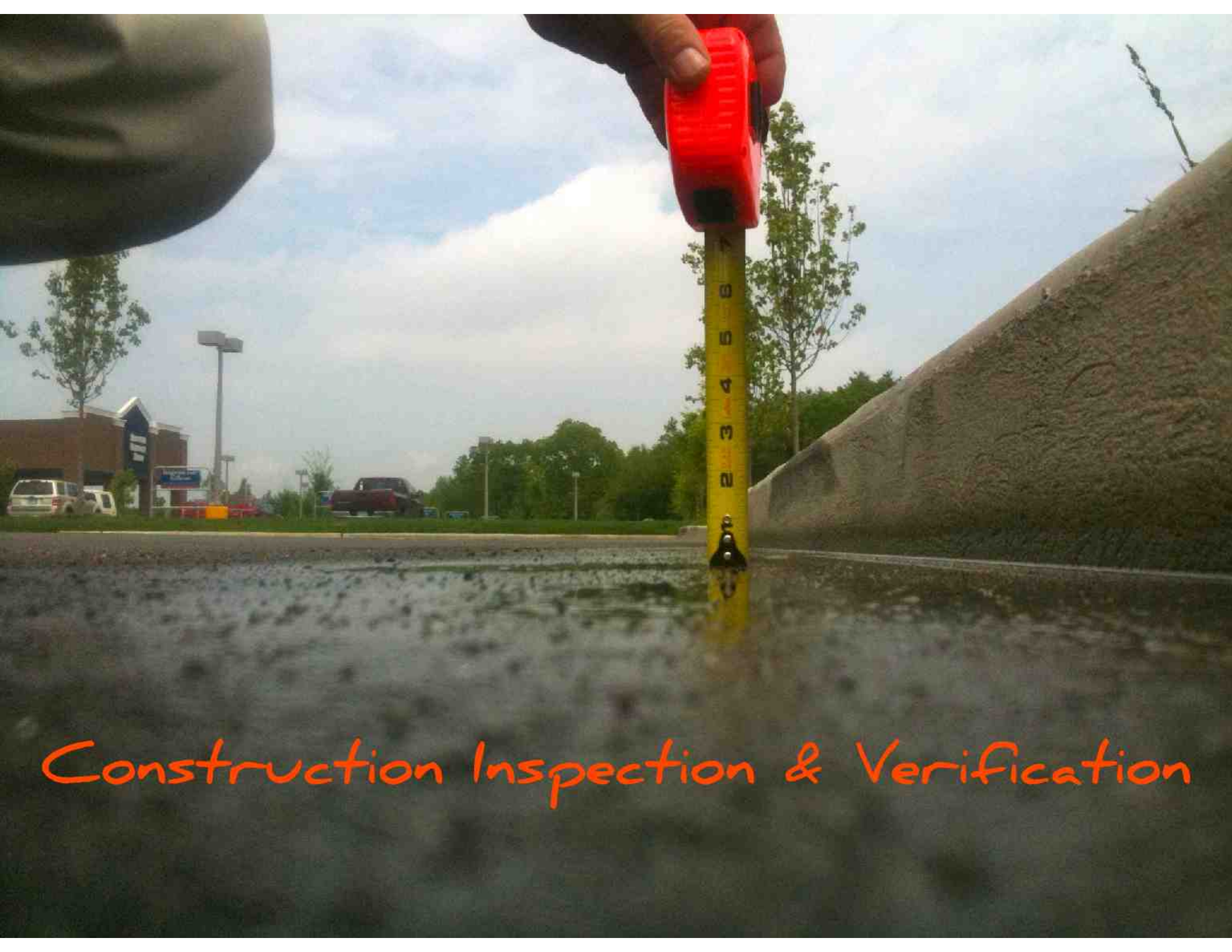
What needs to be done

How much does maintenance cost?

Who can do this

Who is responsible

What needs to be done



Construction Inspection & Verification

LID changes design.
Shouldn't verification change??

Changing the roles of:

- Municipality
- Sediment Control Inspectors
- Certifying Professionals

A person wearing a yellow jacket, a black cap with a red brim, and grey pants is standing in a garden. They are looking down at a garden bed that contains several white bags and some young plants. The garden is situated on a grassy slope next to a wooden building with a deck. In the background, there are trees and a house.

Operating Inspection

Universal factors

- Dewatering
- Pollutant sources
- Sedimentation
- Structural Integrity



Other factors

Plant Material



Erosion



Caking





Mulch

2/28/08

2258

BIOSWALE
#2

ERODED MULCH

11/06/2197

Photo provided by Stormwater Maintenance, LLC

Vermin





Construction Issues



- Universal factors
- Dewatering
 - Pollutant sources
 - Sedimentation
 - Structural Integrity

Preventative Maintenance

Maintenance burden is reduced.



Maintenance burden is reduced



because pollutant loads are dispersed

assuming maintenance actually happens



Sweep Permeable Paving

A photograph of a residential area. In the foreground, there is a concrete sidewalk. Behind it is a green lawn. In the middle ground, there is a large, irregularly shaped garden bed covered in dark brown mulch. Several small, bare, reddish-brown shrubs are planted in the garden bed. A white utility box is visible in the center of the garden bed. In the background, there are several multi-story residential buildings with light-colored siding and stone accents. A white dog is visible near the entrance of one of the buildings. The text "Vegetation-based" is overlaid in a large, orange, handwritten-style font across the middle of the image.

Vegetation-based



Vegetation-based

Routine Mulch Maintenance

10/23/08 1982
BIO #4
LACK OF MULCH
38'x9'

10/23/2008 12:55



minor erosion...



...creates sediment





mulch
replacement



Preventative
Maintenance

assuming maintenance actually happens

Major Repairs

Most repairs are due to construction issues

INCPD

Most repairs are due to construction issues

media replacement
underdrain reconstruction



permeable pavement repair



How much does maintenance cost?

Permeable Paving maintenance:

- \$.015 - \$.025 per sf
- \$625 - \$1,100 per acre

Frequency: Annual



Passive Vegetative Practices
Disconnections, Buffers, etc.

Regenerative
Normal turf costs
As needed



But what can go wrong???

A photograph showing a wooden fence in a grassy area. The fence is made of weathered wooden posts and rails. To the right of the fence is a concrete path. The ground is covered with green grass and some brown patches, possibly from fallen leaves or soil. The text "Vegetation issues" is written in a large, orange, handwritten-style font across the bottom of the image.

Vegetation issues



Sediment



Sediment



Spills

Bioretention

Doing it right: \$0.60 per sf

- Quarterly visits
- Veg pruning & replacement
- Fertilizer, Pesticides
- Mulch replacement
- De-caking
- Minor repairs
- Annual inspections

Bioretention

Doing it wrong: \$0.10 - \$0.20 per sf

- Typical landscape maintenance

Bioretention
Do nothing: Priceless

Other Practices:
As needed
Based on Owner or
Municipal inspections

Who can do this

understanding function



10/23/08

1982

Details, details, details

BIO #4

TAA



10/23/08

1982

Details, details, details

BIO #4

I-A44

10/23/2008 12:53

Right-sized equipment





Construction:
Who's building these things?

Construction:
Who's building these things?

Lot grading contractors:
Grade-to-drain mentality
Sufficient Technical knowledge?

Landscapers
Equipment limitations
Utility / Construction capabilities?

Grade-to-drain mentality
Sufficient Technical knowledge

Landscapers
Equipment limitations
Utility/fine grading capabilities?

Utility / Excavation firms
Sequencing issues
Right-sized equipment?

Inspectors

- Municipalities

- Engineers

- Landscape Architects

- HOMEOWNERS???

Maintenance Contractors

- Landscapers
- Excavation / Utility
- Specialized / Hybrid
- HOMEOWNERS???

Understanding Function:

- Impoundment
- Dewatering
- Pollutant uptake
- HOMEOWNERS???

Education

Communication

Who is responsible



Inspection

Preventive: Maintenance provider

Enforcement:

- Maintenance provider?
- Municipality?

Enforcement:

- Maintenance provider?
- Municipality?
- 3rd party?
- Landowner?

Education

Communication

Maintenance

Municipal : DPW

Commercial: Landowners

Condos: Association

Residential Common Areas:
Association?
Municipality?

Residential On-lot:
Individual Lot Owners?

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municipality?

Residential On-lot:
Individual Lot Owners?

Individual Lot Owners?

Enforcement: Municipality

Education

Communication

LID changes design.
Shouldn't verification change??



"....we do not have an answer to ESD on-lot maintenance...."

- Jay Sakai, Director, MDE Water Management Administration

May 17, 2011, Chesapeake Water Environment Assoc. Seminar