Nothing Compares
NORTH CAROLINA

Annette Lucas, PE

National Stormwater Roundtable

February 23, 2018

Department of Environmental Quality

NC's solution to staffing shortages:

Questions I will answer about the Minimum Design Criteria (MDC):

- What are they?
- How did we get them?
- Where are they?
- Why do they matter?

WHAT are MDC?

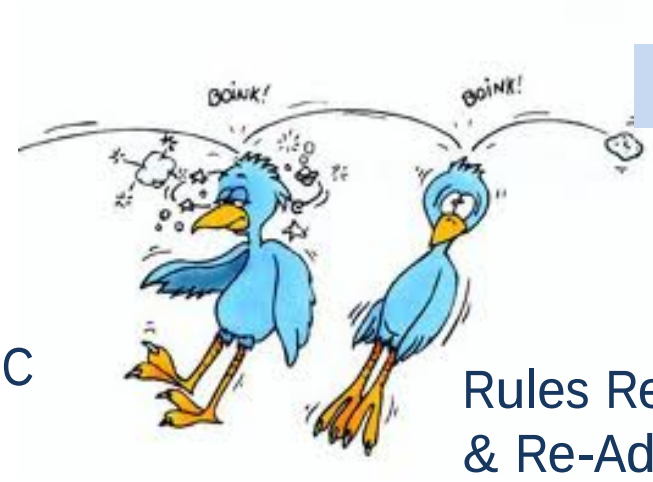
All-inclusive list of requirements for siting, design, construction, and O&M for SCMs.

2013 Legislative Mandates

§ 143-214.7B requires DEQ to work with stakeholders to develop Minimum Design Criteria.

§ 150B-21.3A directs state agencies to review and update their rules every 10 years.

A single rule-making



MDC

Rules Review
& Re-Adoption

How we got them: The MDC Team

Engineering/design community (8)
Home Builder's Association (1)
Construction (1)
Local government (4)
Environmental Group (2)
Landscape Architect (1)
Academia (2)
Soil Scientist (1)
DOT (1)
DEQ(4)

5.5 hour meetings
One time a month
18 months

Function in perpetuity

Remove TSS

Protect WQ standards

WHERE are the MDC?

v 2H .1000 S
.050: MDCs
: MDCs for

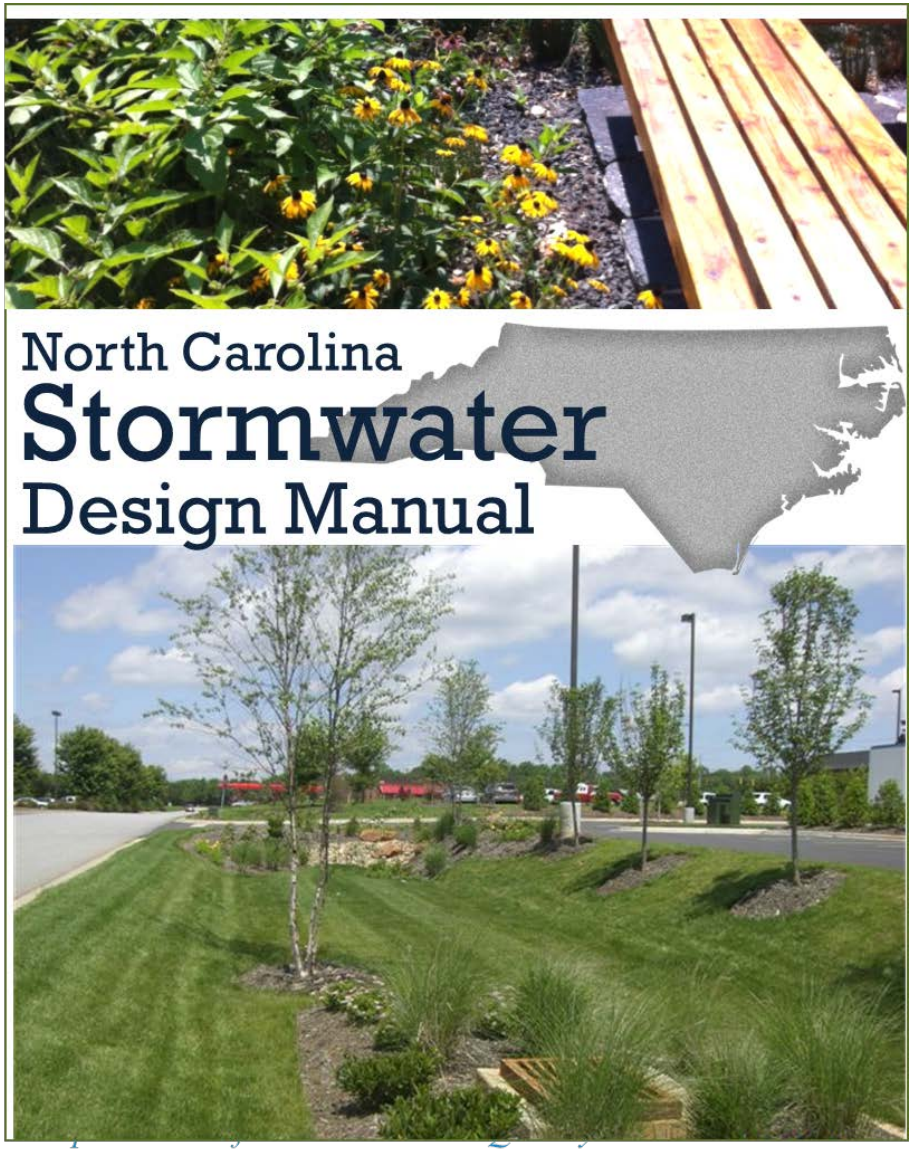

.1052 Bioretention


.1058 Permeable Pavement


.1055 Stormwater Wetland


.1054 Wet Pond


.1051 Infiltration



The manual repeats rule language & provides technical guidance about how to meet the MDC.

1.1. Guidance on MDC

MDC 1. MAIN POOL SURFACE AREA AND VOLUME.
The main pool of the wet pond shall be sized using either:
The Hydraulic Retention Time (HRT) Method; or
The SA/DA and Average Depth Method.

The calculation of the volume of the main pool under this MDC does not include the volume of the forebay. The forebay will be added to the main pool per MDC 4 below.

The Hydraulic Retention Time (HRT) Method is based on setting a ratio between the permanent pool and temporary pool volume that results in a stormwater residence time of at least 14 days. This method does not create a direct correlation between the pond's surface area and average depth but instead allows the designer to determine the pond geometry that works best for the site.

Ponds designed under the HRT Method will typically have an average depth of eight feet or less. If a pond's average depth does exceed eight feet, then the equation below shall only apply to the portion of the pond that is above the eight-foot average depth threshold. (In other words, the deep portions of the main pool shall not be considered to provide pollutant removal.)

The total main pool volume is determined by the following equation:

Main Pool Volume, V_{MP}:

$$VMP = 0.87 * \frac{HRT}{Ts} * WQV$$

Where:

0.87	=	Factor to adjust for the volume in the forebay
VPP	=	Main pool volume in feet3
HRT	=	Required hydraulic residence time (14 days)
TS	=	Average time between storm events (5 days)
WQV	=	Design volume (i.e., temporary pool volume) in feet3

The **SA/DA Tables with Average Depth Method** is based on providing a minimum surface area to drainage area ratio depending on the percent imperviousness in the drainage area and on the average depth of the pond. The required minimum percentages are outlined in C-1 (Piedmont and Mountains) and Table C-2 (Coastal). Pond with average depths exceeding eight feet should use the eight foot depth column in determining surface area.

Table C-1: Piedmont and Mountain SA/DA Table (Adapted from Driscoll, 1986)

Percent Impervious Cover	Permanent Pool Average Depth (ft)					
	3.0	4.0	5.0	6.0	7.0	8.0
10%	0.51	0.43	0.37	0.30	0.27	0.25
20%	0.84	0.69	0.61	0.51	0.44	0.40
30%	1.17	0.81	0.84	0.72	0.61	0.56
40%	1.51	1.22	1.09	0.91	0.78	0.71
50%	1.79	1.47	1.31	1.13	0.95	0.87
60%	2.09	1.73	1.49	1.31	1.12	1.03
70%	2.51	2.04	1.80	1.56	1.34	1.17
80%	2.92	2.36	2.07	1.82	1.62	1.40
90%	3.25	2.64	2.31	2.04	1.84	1.59

Table C-2: Coastal SA/DA Table (Adapted from Driscoll, 1986)

Percent Impervious Cover	Permanent Pool Average Depth (ft)					
	3.0	4.0	5.0	6.0	7.0	8.0
10%	0.59	0.49	0.43	0.35	0.31	0.29
20%	0.97	0.79	0.70	0.59	0.51	0.46
30%	1.34	1.08	0.97	0.83	0.70	0.64
40%	1.73	1.43	1.25	1.05	0.90	0.82
50%	2.06	1.73	1.50	1.30	1.09	1.00
60%	2.40	2.03	1.71	1.51	1.29	1.18
70%	2.88	2.40	2.07	1.79	1.54	1.35
80%	3.36	2.78	2.38	2.10	1.86	1.60
90%	3.74	3.10	2.66	2.34	2.11	1.83

Guidance on the MDC

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Blue Boxes = Rules
Everything else is guidance!

C-4. Wet Pond

Design Objective

A wet pond shall be designed to capture the design storm and release it slowly over a period of two to five days via a properly design outlet structure. Stormwater shall have an adequate flow path to bring about removal of TSS through dilution and settling. The pond shall be designed in a manner that protects the device, the areas around the device and the receiving stream from erosion. The pond also must be maintained properly to prevent the resuspension of captured sediments.

Design Volume

The design volume for a wet pond is equivalent to the volume that is retained for a two to five-day period between the temporary pool elevation and the permanent pool elevation.

Important Links

Rule 15A NCAC 2H .1054. MDC for Wet Ponds

SCM Credit Document, C-4. Credit for Wet Ponds

Figure C-2: Basic Wet Pond Elements: Cross-Section View 1

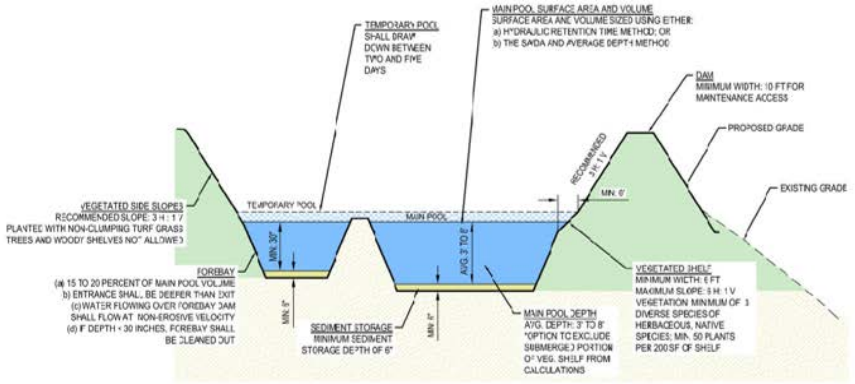
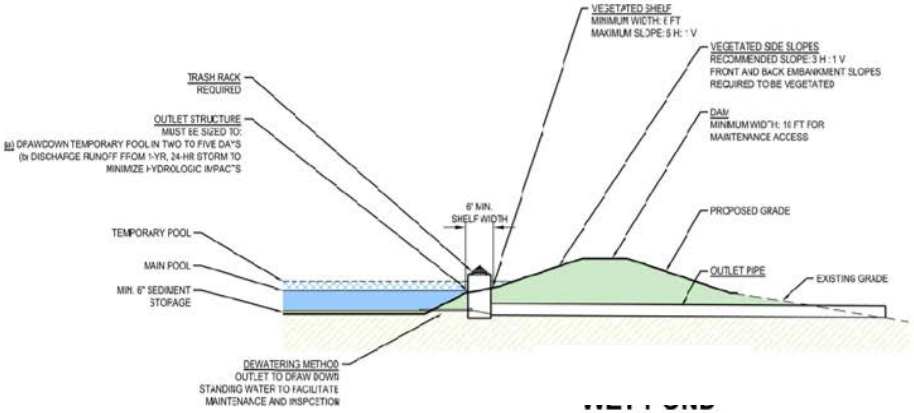
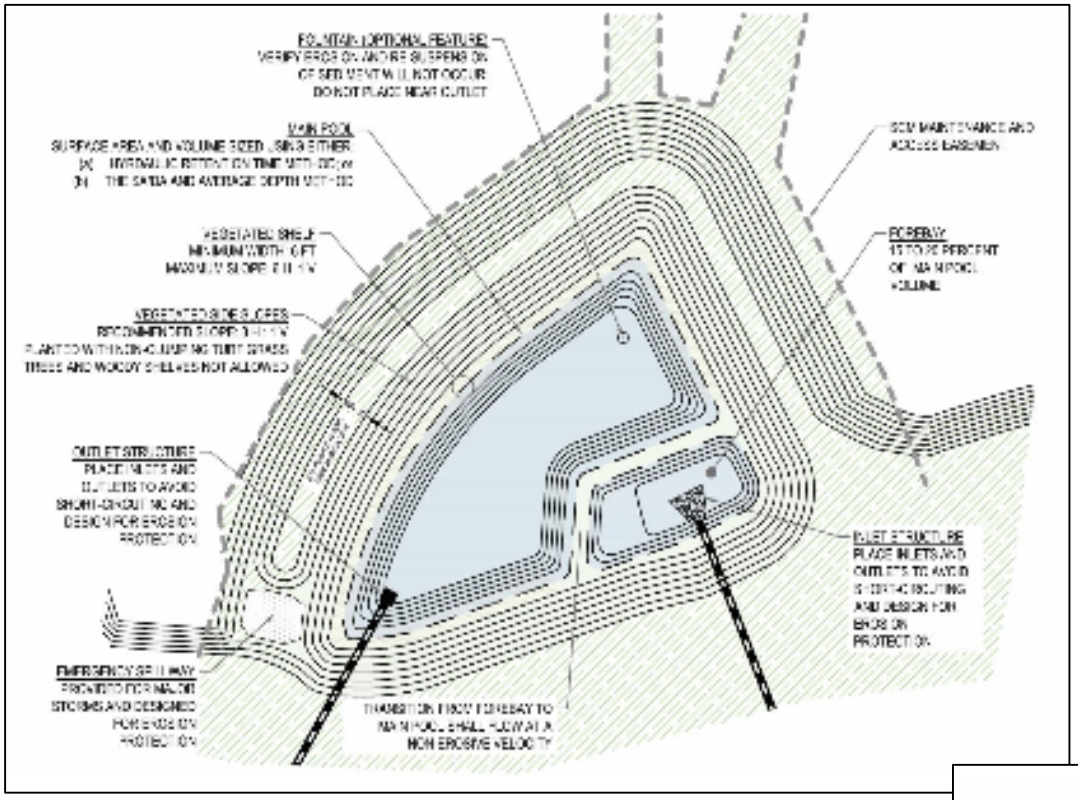
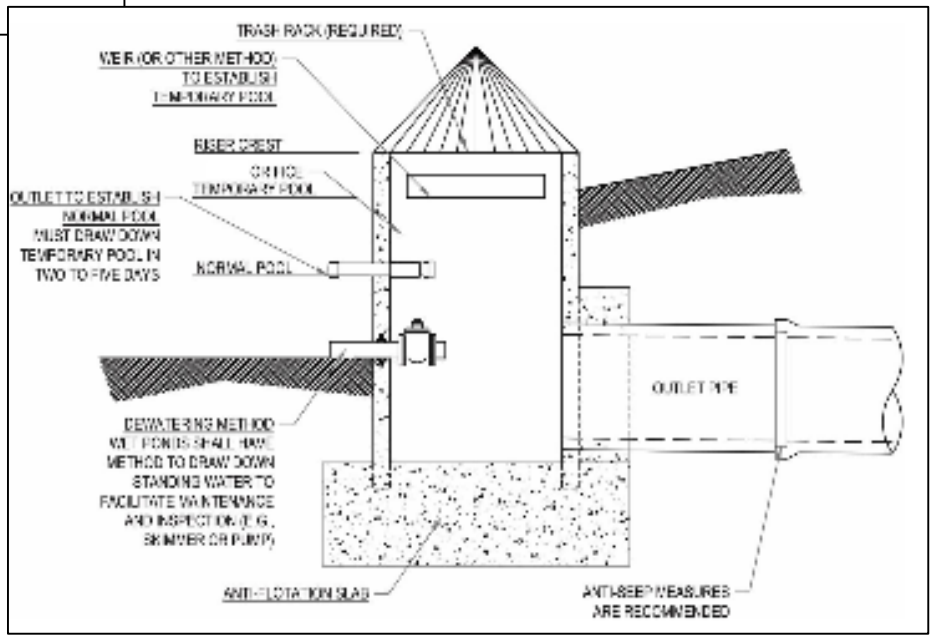


Figure C-3: Basic Wet Pond Elements: Cross-Section View 2







These diagrams are GUIDANCE!

Why do the MDC matter?

They got the legislature off our backs for a while.

SCMs are now more efficient AND effective.



Compared to what we had before:

Updated
Shorter
Focused

. . . and . . .

Give the designer more freedom / responsibility to use technical expertise, engineering judgement, creative rationalizations . . .

Better Vegetation Guidance:

Advice on how to choose, establish & maintain plants in:

- Bioretention cells
- Stormwater wetlands
- Infiltration systems
- Wet ponds

Any SCM can be used for flood control, including:

Infiltration Systems More Common Now

Shall dewater within 72 hours based on a soil investigation.

No longer require a flow splitting device.

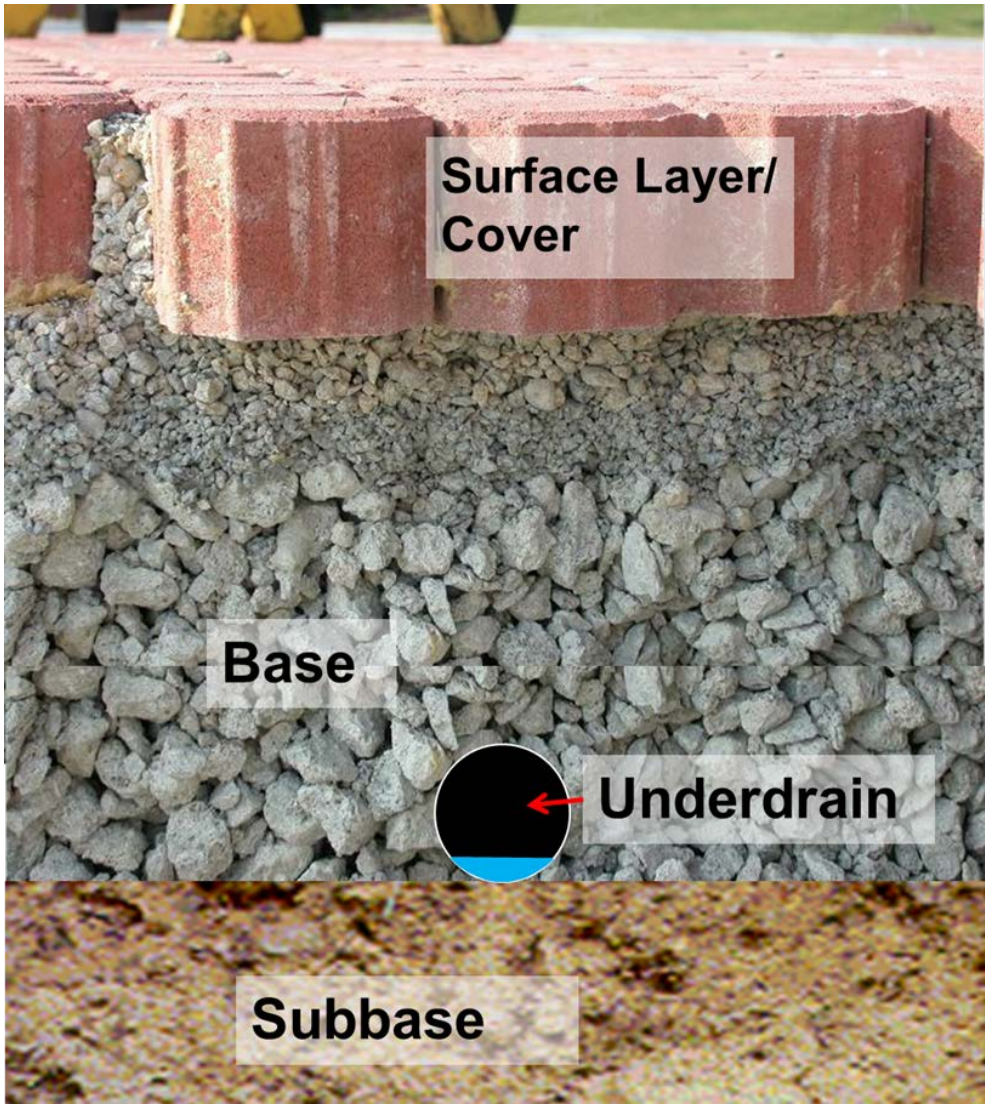
New Permeable Pavement Credit

Full treatment credit for:

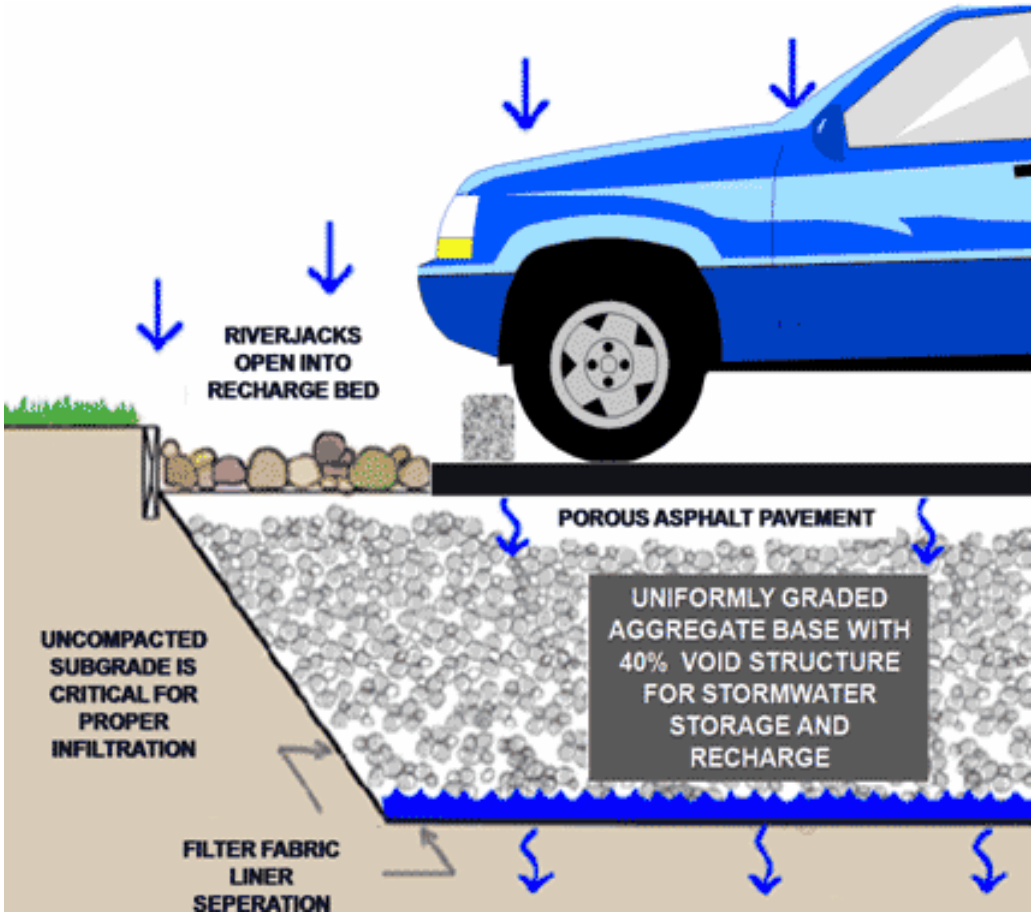
- Its surface area.
- Up to 1:1 ratio of additional BUA that drains to it.
- Unlimited rooftop runoff that drains to it.

+

Its footprint is considered “pervious.”



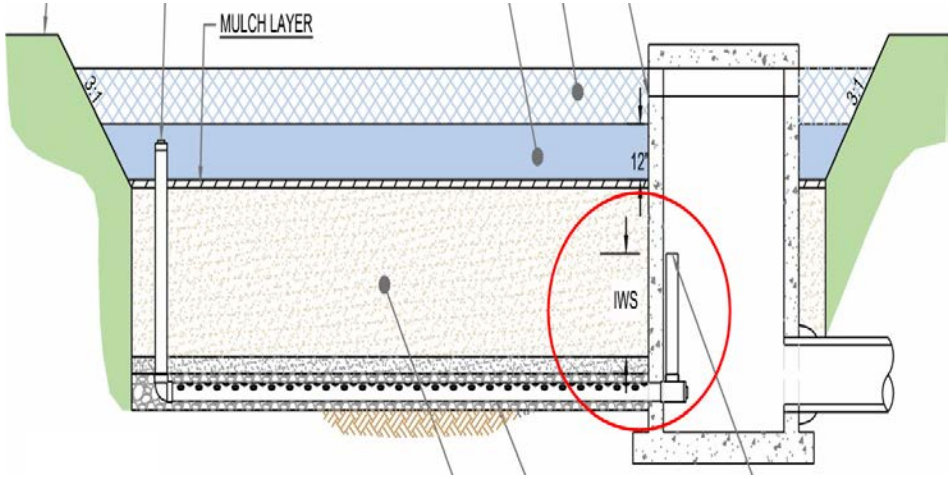
Permeable Pavement



An SCM you can drive & park on!

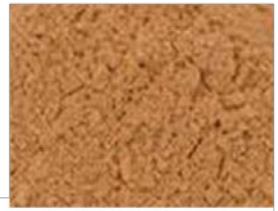

Adjacent BUA

Bioretention Cell Design Improvements



IWS is required

75-85% *medium to coarse* washed sand



8-10% fines

5-10% organic

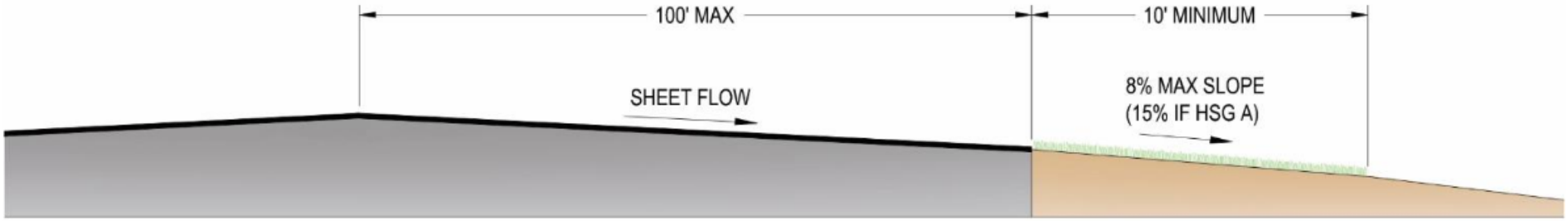
50% canopy at maturity
OR
Non-clumping, deep-rooted sod

Disconnected Impervious Surface Credit

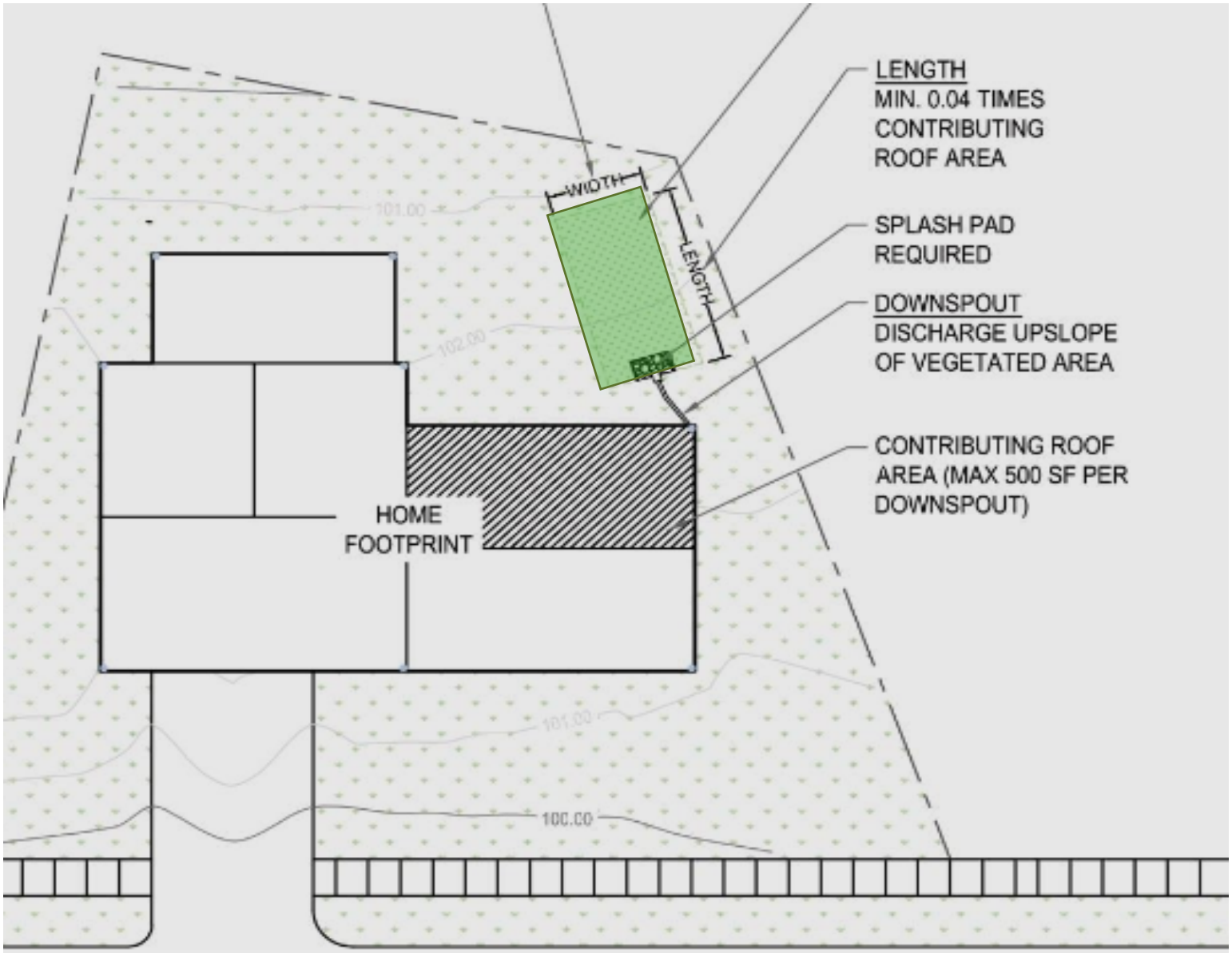
VEGETETATED RECEIVING AREA SPECIFICATIONS
1) NO BUA WITHIN FOOTPRINT
2) TRAVERSE SLOPE:
   A. LESS THAN 8% (HSG B, C, AND D), OR
   B. LESS THAN 15% (HSG A)
3) ADJUST PH, COMPACTION AND OTHER ATTRIBUTES OF FIRST 8 INCHES OF SOIL TO PROMOTE PLANT GROWTH
4) PLANT WITH NON-CLUMPING, DEEP-ROOTED GRASS
5) STABILIZE SOILS UNTIL COVER HAS BEEN ESTABLISHED

Runoff Reduction:

A soils:	65%
B soils:	50%
C soils:	40%
D soils:	30%

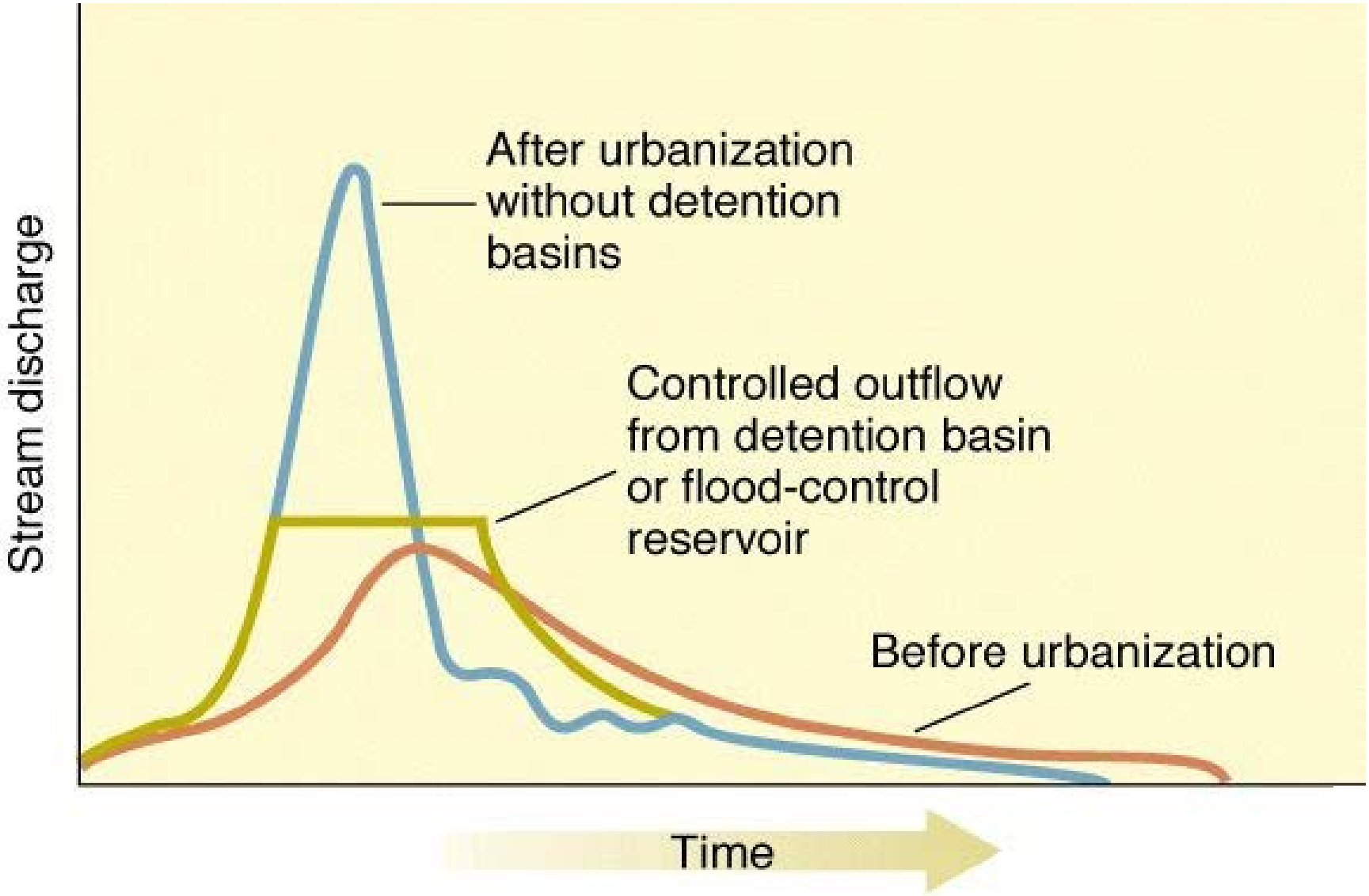


Disconnected Roof



They can be attractive, but not always. . .

How wet ponds turn streams into ruts



The space they take up can no longer be used.

Training & Credit

- Training & Credit Overview
- Distance Education
- Workshops
- Graduate Education
- Professional Development Hours (PDH)

Welcome to the MDC

January 11-12, 2017 - Greensboro
J. Edward Kitchen Operations Center
2602 S. Elm-Eugene Street
Greensboro, NC 27406
Click Here to Register

January 25-26, 2017 - Raleigh
Jane S. McKimmon Center
1101 Gorman Street
Raleigh, NC 27606
Click Here to Register

February 15-16, 2017 - Wilmington
New Hanover Executive Development Center
1241 Military Cutoff Road
Wilmington, NC 29405
Click Here to Register

March 9-10, 2017 - Kannapolis
David H. Murdock Core Laboratory Building
150 Research Campus Drive - 1st floor
Kannapolis, NC 28081
Click Here to Register

Thank you!

Department of Environmental Quality