MCM 5:
A Simplified Approach & Stormwater Management Design Assistance Manual Option

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Presentation by: P. Eric Mains, PE

"…is this the *cure all* dynamic duo?"

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Course Agenda

- Introduction
- General Stormwater Overview
- Common Applications for SA
- Non-Applications
- Implementing SA
- Processing by Municipality
- Completing Municipality Worksheets
- Review of Common BMPs
- Typical Design Examples using SA
- Questions

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Introduction

MCM 5: Post-Construction Stormwater Management Activities

- Require the implementation of structural and/or non-structural BMPs for new development and/or redevelopment projects
- Ensure and inspect all Post-Construction BMPs after construction
- Implement and enforce an ordinance to ensure the implementation of BMPs

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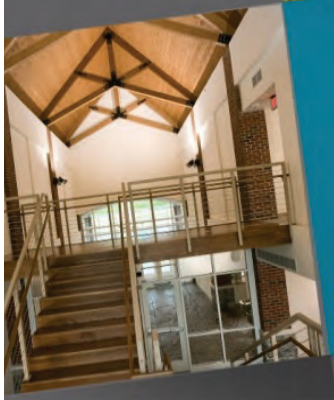

General Stormwater Overview

General Stormwater Overview

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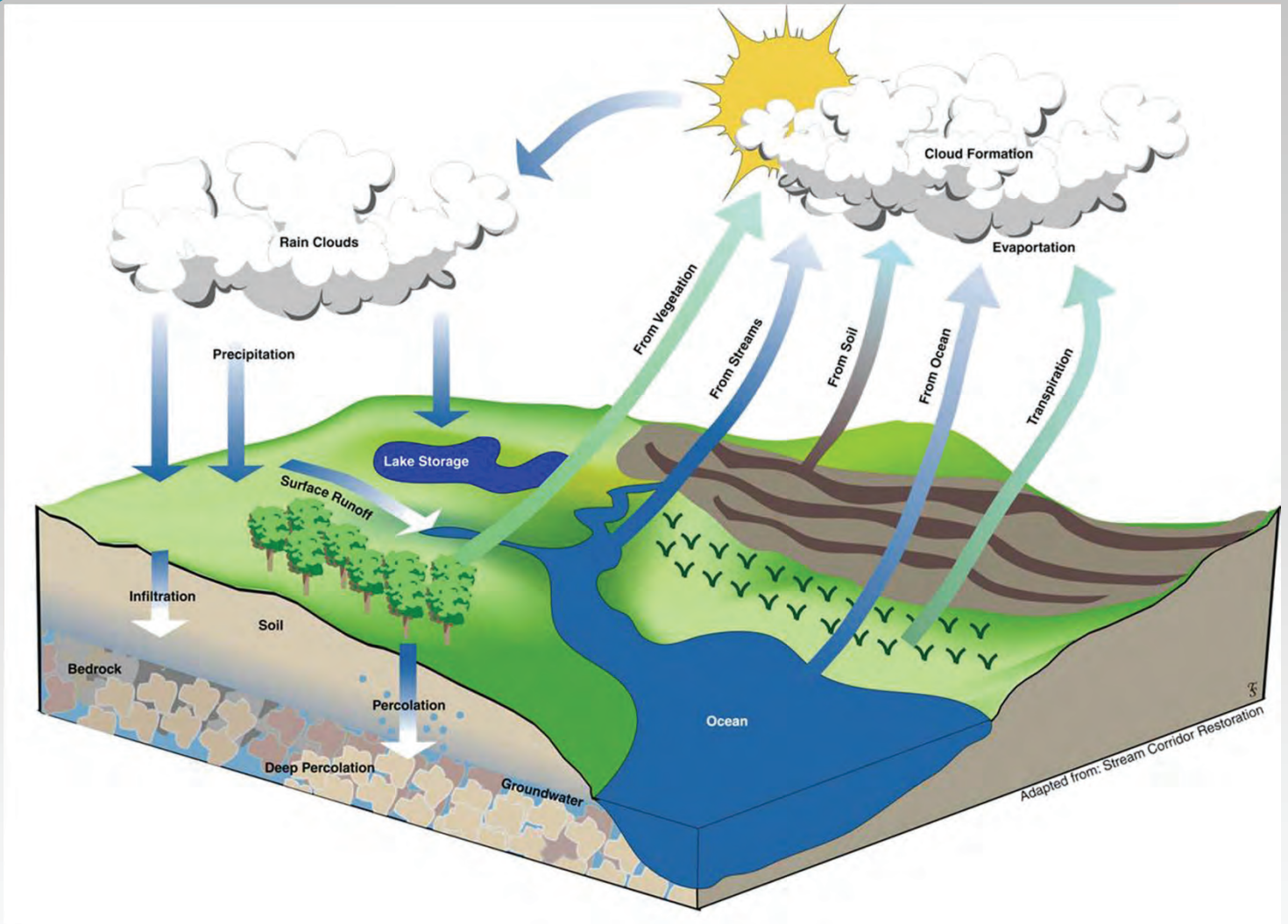
The Hydrologic Cycle



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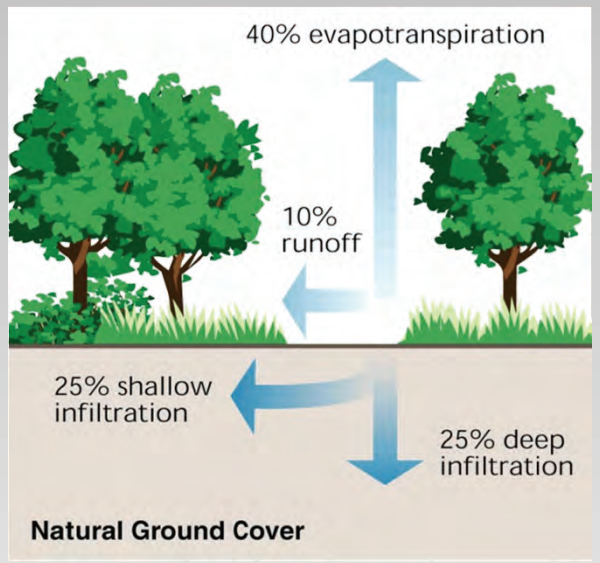

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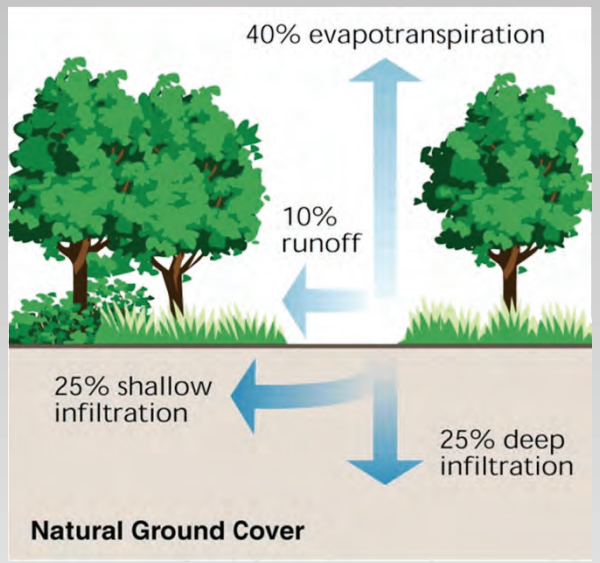

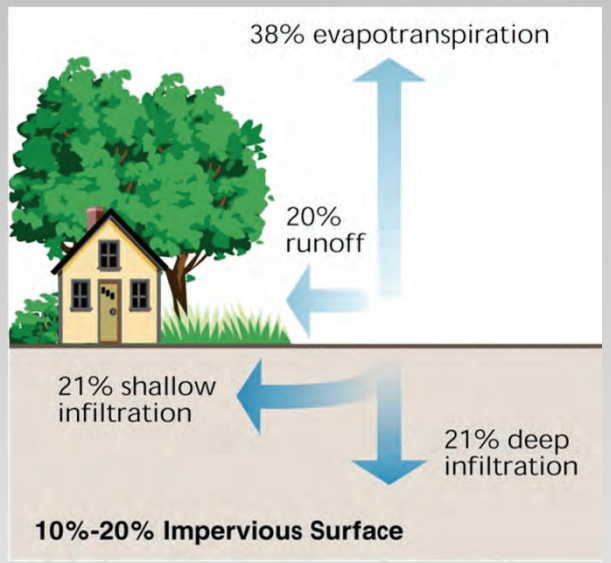

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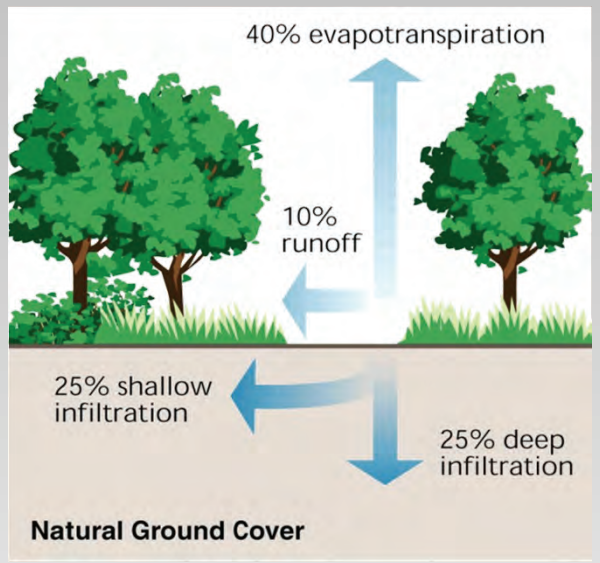

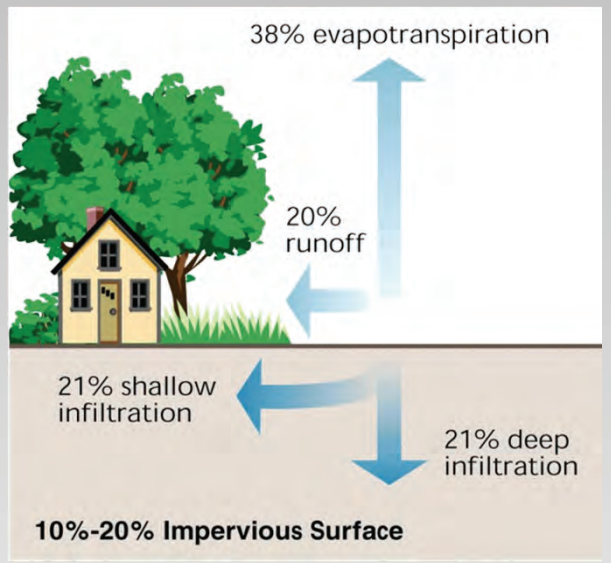

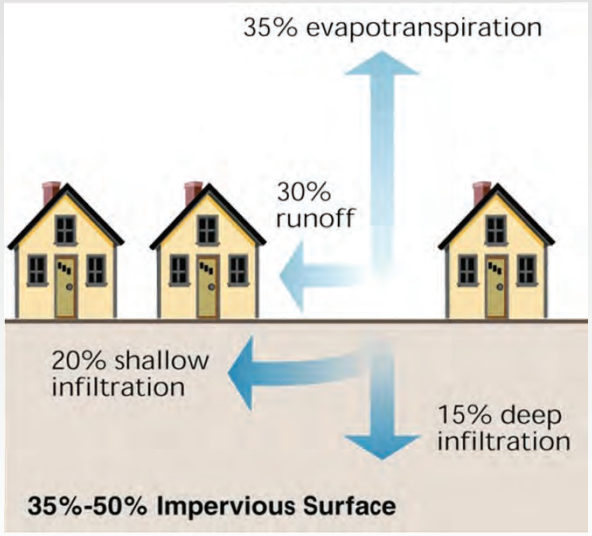

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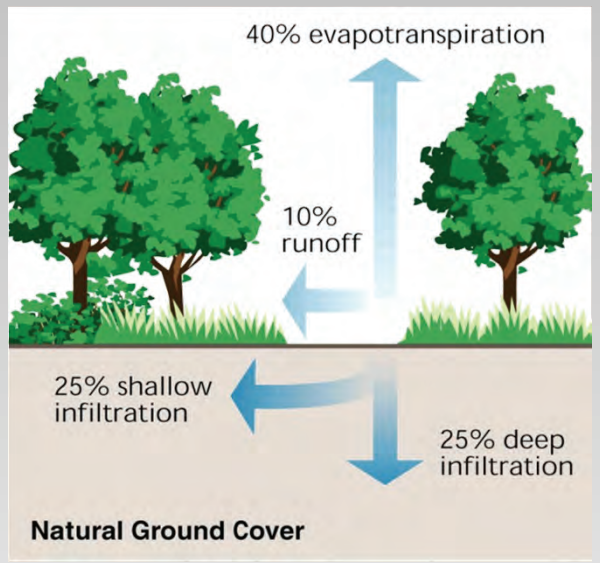
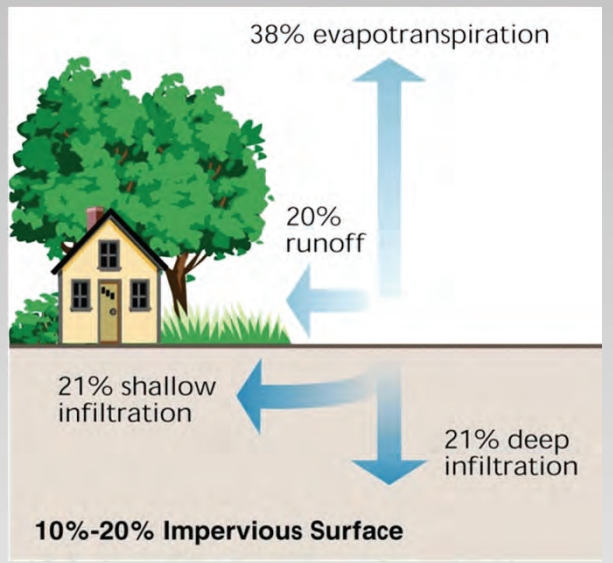
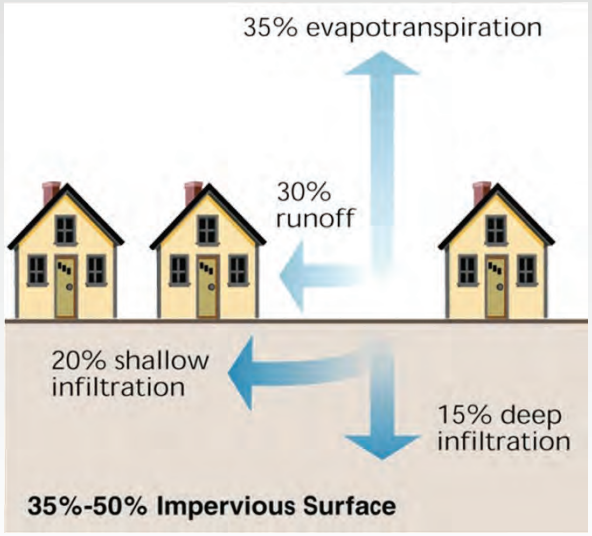
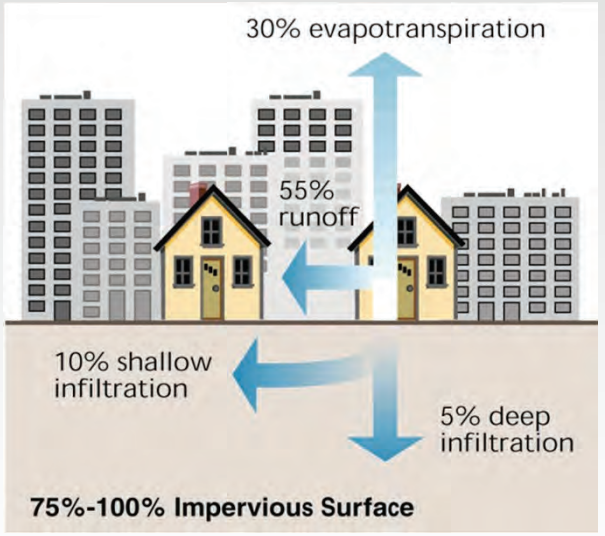
The Hydrologic Cycle









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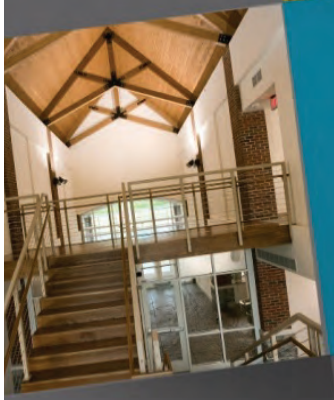

Common Applications for SA

Common Applications for SA

- Single-family home construction
- Garage/building additions
- Patio/decks
- Driveway expansions
- Retrofits

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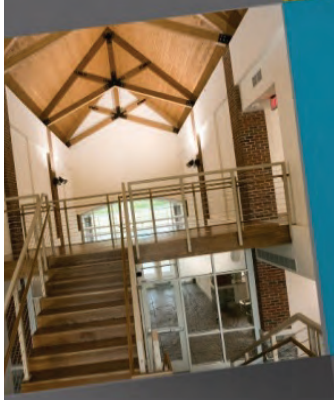

Non-Applications

Where SA Will Not Work

- Large-scale subdivision
- Commercial development
- Public infrastructure projects
- Sites with pre-existing drainage issues

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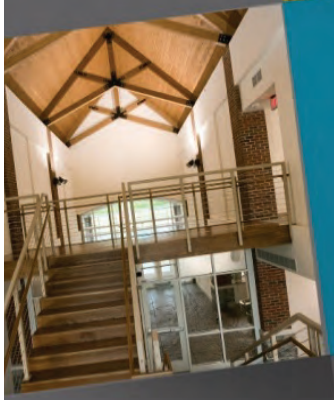

Implementing SA

Implementing SA

- Determine the Needs of Municipality
- Thoroughly Review ACT 167 Version with planning and professional staff
- Make edits as deemed necessary
- Edit Stormwater Ordinance to Integrate with SA
- Adopt by reference to allow future changes

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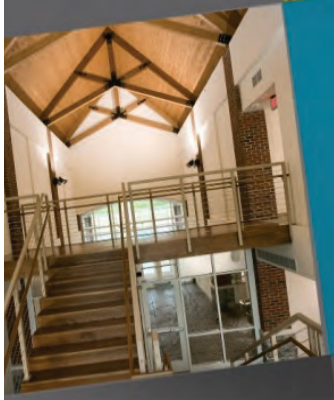

Processing by Municipality

Processing by Municipality

- Review Submitted Forms for completeness
- Verify amount of Impervious Area
- Verify status
  - Exempt
  - Non-exempt

- Determine if Erosion Control Planning is required/appropriate
- Coordinate with P/C and BOS or Council, if not exempt
- Issue approval/acknowledgement/denial

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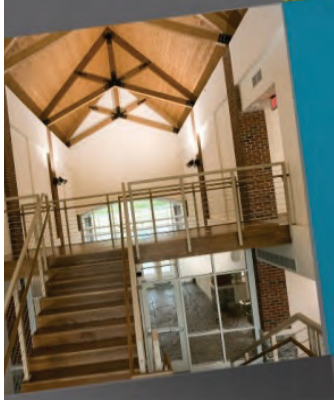

Completing Municipal Worksheets

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Completing Municipal Worksheets

Municipal Stormwater Management Worksheet

For Municipal Use and Record of Project Area

Property Owner's Name _____

Address of Property_____

Parcel ID #_____ Municipality _____

Phone Number _____ New Impervious Area Associated with this Project _____

Stormwater Project Type: _____ Exempt _____ Minor Plan _____ Project Requires Formal SWM Plan

Total New Impervious Area Since Adoption of SWM Plan _____

Acknowledgement - I declare that I am the property owner, or representative of the owner, and that the information provided is accurate to the best of my knowledge. I understand that stormwater may not adversely affect adjacent properties or be directed onto another property without written permission. I also understand that false information may result in a stop work order or revocation of permits. Municipal representatives are also granted reasonable access to the property for review and/ or inspection of this project if necessary.

Signature _____ Date _____

Step 1: Determine the amount of new impervious area created by the proposed project. This includes any new surface areas that prevent infiltration of stormwater into the ground. New stone and gravel areas are considered impervious. Impervious areas existing before November 23, 2011 are not included in this calculation. Use additional sheets if necessary

Calculate new impervious area by completing this table.

Surface	Length (ft)	x	Width (ft)	=	Impervious Area (ft²)
Buildings		x		=	
Driveway		x		=	
Parking Areas		x		=	
Patios/ walkways		x		=	
Other		x		=	
			Total Proposed Impervious Surface Area (Sum of all impervious areas)		

- If the total new impervious surface area is **up to 1,000 ft²**, the project is exempt from the requirement to submit a plan for approval. Sign Acknowledgement and file this sheet with municipality.
- If total impervious surface area is **1,001 ft² to 10,000 ft²**, continue to Step 2.
  - If project area can be entirely disconnected, sign Acknowledgement and file worksheets with municipality.
  - If project is between 1,000 ft² and 5,000 ft² and requires BMPs, complete step 3.
  - If project area is 5,000 ft² - 10,000 ft² and can't be disconnected, the project does not qualify for the Simplified Approach.

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Completing Municipal Worksheets

Municipal Stormwater Management Worksheet

Step 2: Determine Disconnected Impervious Area (DIA). All or parts of proposed impervious surfaces may qualify as Disconnected Impervious Area if runoff is directed to a pervious area that allows for infiltration, filtration, and increased time of concentration. The volume of stormwater that needs to be managed could be reduced through DIA. Prepare a minor stormwater site plan (see pg C-5 for requirements).

Criteria

- Overland flow path from the discharge area or impervious area has a positive slope of 5% or less.
- Contributing area to each rooftop discharge (downspout) is 500 ft² or less.
- Soils are not classified as hydrologic soil group "D".
- The receiving pervious area shall not include another person's property unless written permission has been obtained from the affected property owner.

Partial Rooftop Disconnection		
Length of Pervious Flow Path (ft) Lots ≤ 10,000 ft²	Length of Pervious Flow Path (ft)	DIA Credit Factor
35 or more	75 or more	0
30 – 34.9	60 – 74	0.2
23 – 29.9	45 – 59	0.4
16 – 22.9	30 – 44	0.6
8 – 15.9	15 – 29	0.8
0 – 7.9	0 - 14	1.0
Pervious flow path must be at least 15 feet from any impervious surface		

Paved Disconnection Criteria: Paved surfaces (driveways, walkways, etc.) and gravel can be considered disconnected if it meets the criteria above and:

- Runoff does not flow over impervious area for more than 75 feet.
- The length of overland flow is greater than or equal to the contributing flow path.
- The slope of the contributing impervious areas is 5% or less.
- If discharge is concentrated at one or more discrete points, no more than 1,000 ft² may discharge to any one point. In addition, a gravel strip or other spreading device is required for concentrated discharges. Non-concentrated discharges along the entire edge of paved surface must include provisions for the establishment of vegetation along the paved edge and temporary stabilization of the area until the vegetation is established.
- If these criteria can be met, the DIA credit = 0

Using the calculations from Step 1, complete the table below. This will determine the impervious area that may be excluded from the area that needs to be managed through stormwater BMPs. If the total impervious area to be managed =0, the area can be considered entirely disconnected.

Surface	Proposed Impervious Area	x	DIA Credit	=	Impervious Area (ft²) to be Managed
Buildings (area to each downspout)		x		=	
Driveway		x		=	
Parking Areas		x		=	
Patios/ walkways		x		=	
Other		x		=	
Total Proposed Impervious Surface Area to be managed (Sum of all impervious areas)					

If total surface area to be managed if greater than 0, continue to Step 3.

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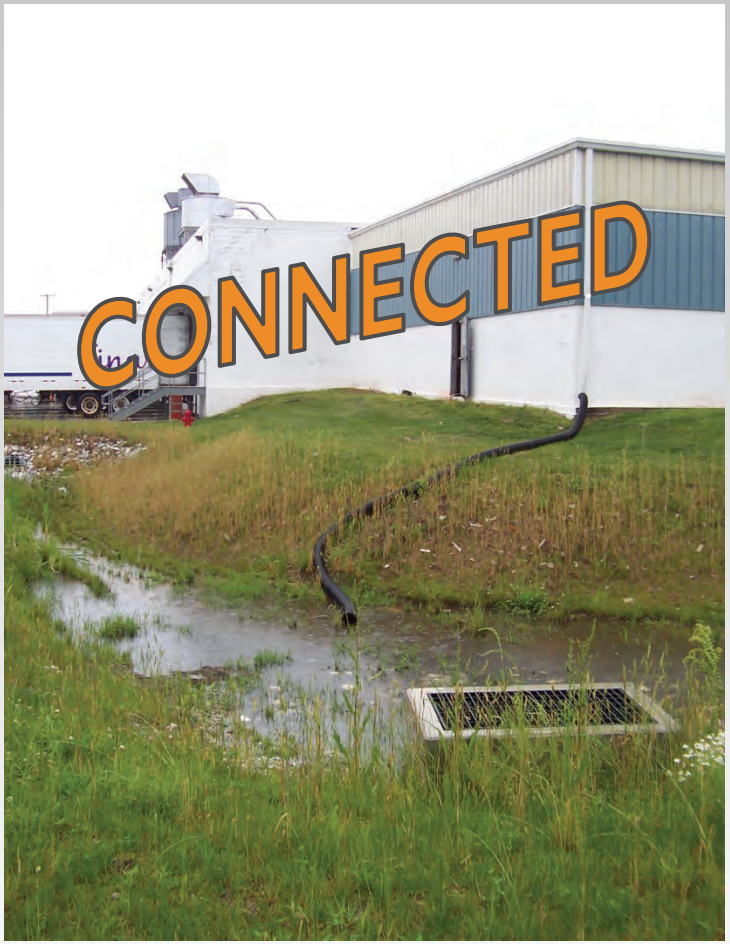
Completing Municipal Worksheets



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Completing Municipal Worksheets

Municipal Stormwater Management Worksheet

Step 3: Calculate the volume of stormwater runoff created by proposed impervious surfaces or see Simple BMP Sizing in Step 4.

Impervious Area (ft²) to be Managed (Sum of Step 2)	X	3.0 in/12 in = 0.25 (30. in is 2-year 24-hour rainfall amount)	=	Amount of Stormwater to be Managed (ft³)
	X	0.25	=	

Best Management Practices need to be used to manage the volume of stormwater created by the proposed impervious areas. The cubic feet of stormwater that need to be managed may also be further reduced by planting new trees. If the criteria below can be met, the amount of stormwater to be managed can be reduced per the following:

Deciduous Trees = 6 ft³ per tree **Evergreen Trees = 10 ft³ per tree**

Criteria:

- Trees must be PA native species (See PA Stormwater BMP Manual for a list)
- Trees shall be a minimum 1" caliper tree and 3 feet tall shrub (min)
- Trees shall be adequately protected during construction
- No more than 25% of the required capture volume can be mitigated through the use of trees
- Dead trees shall be replaced by the property owner within 12 months
- Please consider the specifications for each tree species when determining location and spacing

Amount of Stormwater to be Managed (ft³) (Sum of Step 3)	-	Tree Planting Credit (ft³)	=	Amount of Stormwater to be Managed (ft³)
	-		=	

Step 4: Select BMPs and size according to the volume of stormwater that needs to be managed. The Guide to Choosing Stormwater BMPs, included in the Simplified Approach, includes sizing calculations for specific techniques. ***Simple BMP Sizing*** **-** Sizing BMPs may also be simplified through the use of this chart. Take the sum of Step 2 and match it to the "Amount of New Impervious Area to be Managed" in white boxes in the table below (rounding **up** to the next value if the number is between two values). Then look in the light grey box to determine the cubic footage based on the type of BMP (bioretention or infiltration). For example, if a proposed 1,000 square foot impervious area must handle 240 cubic feet of stormwater in a bioretention system, a 13'x 13'x 1.5' rain garden or a 36'x 2'x 3.5' vegetated swale could be used. Show the location and size of proposed BMPs on the minor stormwater site plan. (The following was based on a chart from the Lycoming Co. Planning Dept)

BMP Type		Simple BMP Sizing - Amount New Impervious Area to be Managed (ft²)											
		250	500	750	1000	1500	2000	2500	3000	3500	4000	4500	5000
Bioretention	Ex. Rain garden, Vegetated swale	60 ft³ or	120 ft³ or	180 ft³ or	240 ft³ or	360 ft³ or	480 ft³ or	600 ft³ or	720 ft³ or	840 ft³ or	960 ft³ or	1,080 ft³ or	1,200 ft³ or
Infiltration	Ex. Dry well, Infiltration trench	180 ft³	360 ft³	540 ft³	720 ft³	1,080 ft³	1,440 ft³	1,800 ft³	2,160 ft³	2,520 ft³	2,880 ft³	3,240 ft³	3,600 ft³

Bring the worksheets, plan, Owner Acknowledgement, and BMP Facilities and Maintenance Agreement (if applicable) to your municipality. If an area greater than 5,000 square feet of earth is disturbed, an erosion and sedimentation (E & S) control plan must be prepared. The municipality may require that the E&S plan be submitted to, reviewed, and approved by the Adams County Conservation District.

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Completing Municipal Worksheets

Municipal Stormwater Management Worksheet

The minor stormwater site plan assists the owner / applicant in preparing the necessary information for the municipality to review and approve.

OWNER ACKNOWLEDGMENT

(Municipality may decide if the Owner Acknowledgement should be notarized and/ or recorded, based on municipal process)

- Development activities shall begin only after the municipality approves the plan.
- The installed BMPs will not adversely affect any property, septic systems, or drinking water wells on this or any other property.
- If a stormwater management alternative to the approved minor stormwater site plan is used, the applicant will submit a revised plan to the municipality for approval. If a site requires a more complex system or if problems arise, the applicant may need the assistance of a licensed professional.
- The applicant acknowledges that the proposed stormwater management BMPs will be a permanent fixture of the property that can not be altered or removed without approval by the Township.

I (we) _____, hereby acknowledge the above statements and agree to assume full responsibility for the implementation, construction, operation, and maintenance of the proposed stormwater management facilities. Furthermore, I (we) also acknowledge that the steps, assumptions, and guidelines provided in this simplified approach package (minor stormwater site plan & Municipal Stormwater Worksheet(s)) will be adhered to.

Signature: _____ Date: _____

Signature: _____ Date: _____

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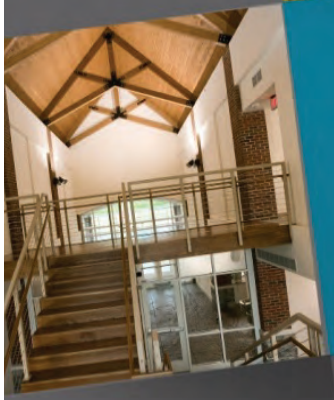
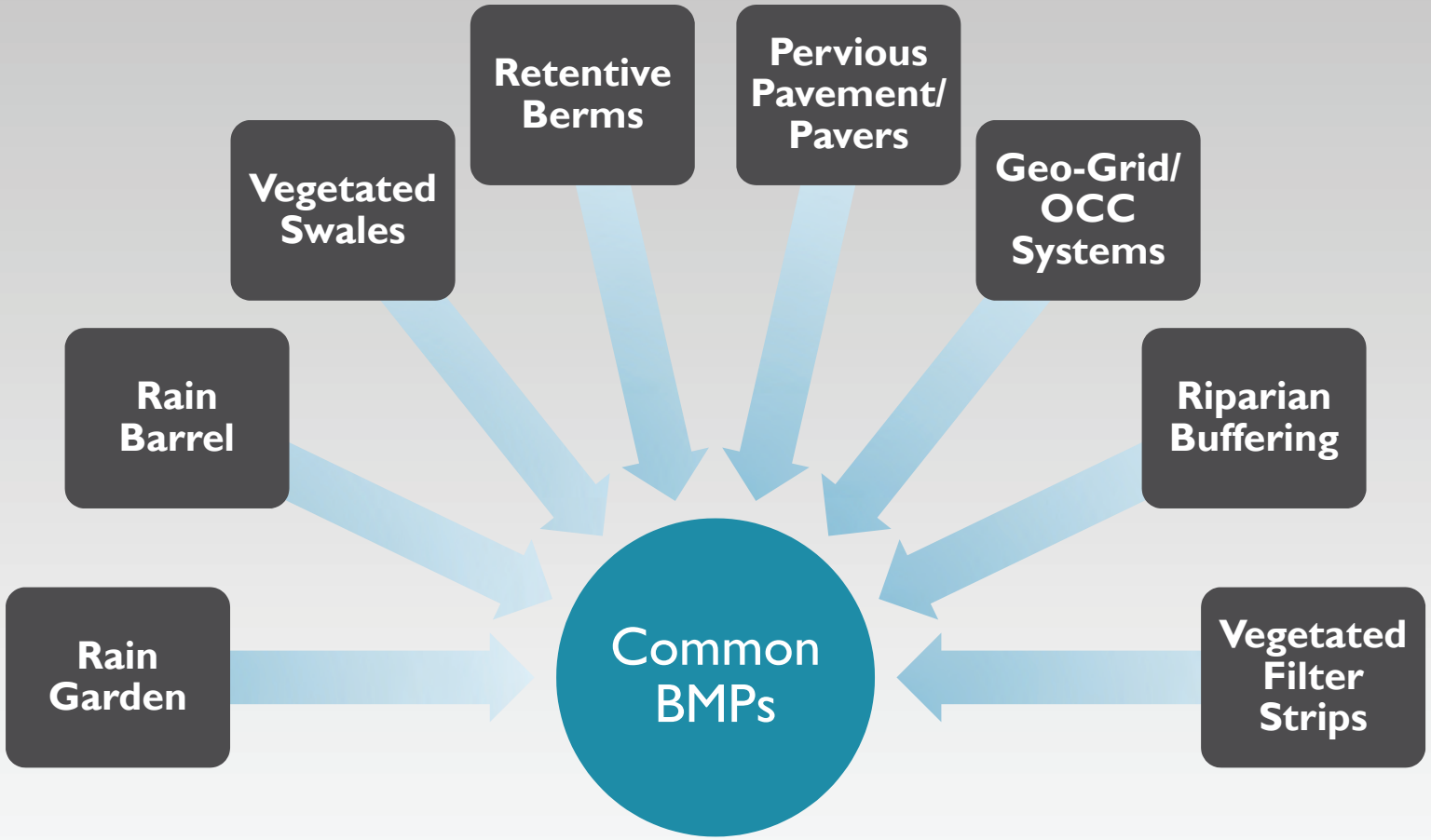


Review of Common BMPs

Common BMPs



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Rain Barrel

Stormwater Cistern

Storage/Reuse

Rainwater Harvesting

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Rain Gardens

Bioretention

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Vegetated Swales

Disconnection

Ditches

Drainage Channel

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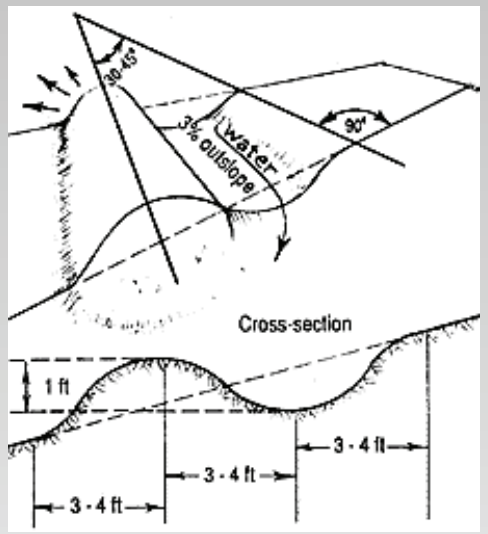
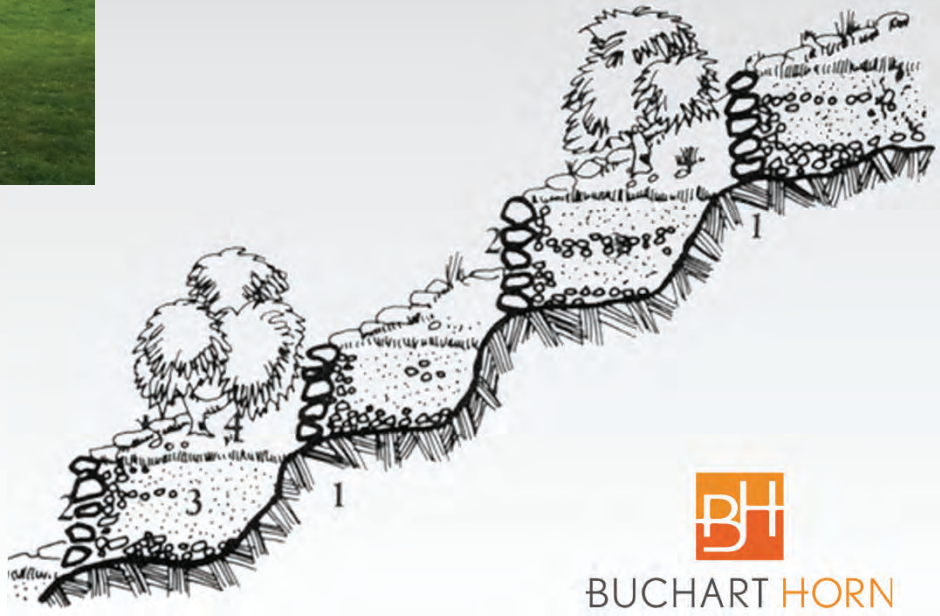
Retentive Berms





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Pervious Pavement/Pavers

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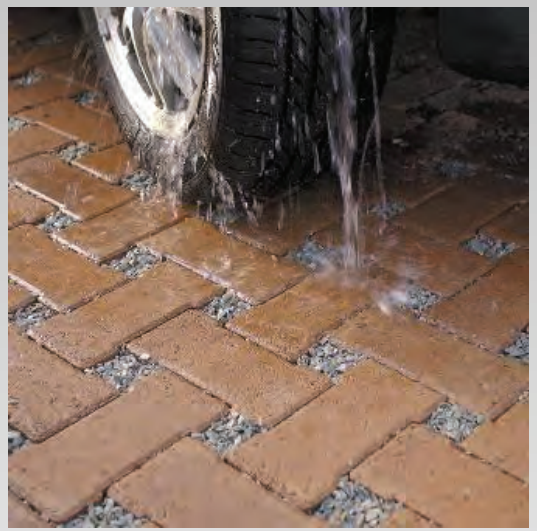
Geo-Grid/OCC Systems



Grass Pavers

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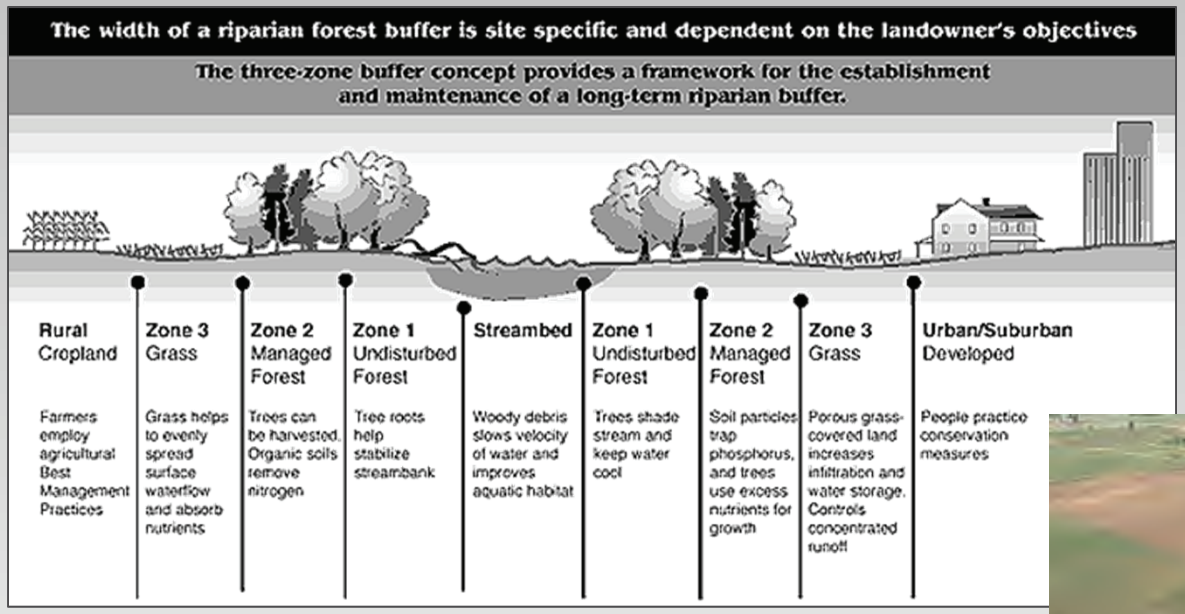
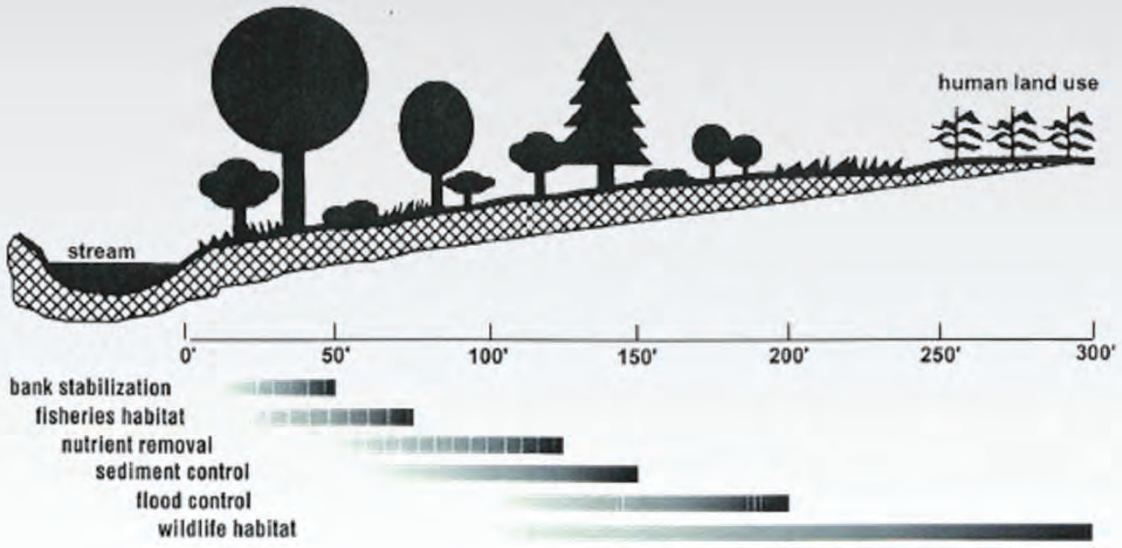
Riparian Buffering





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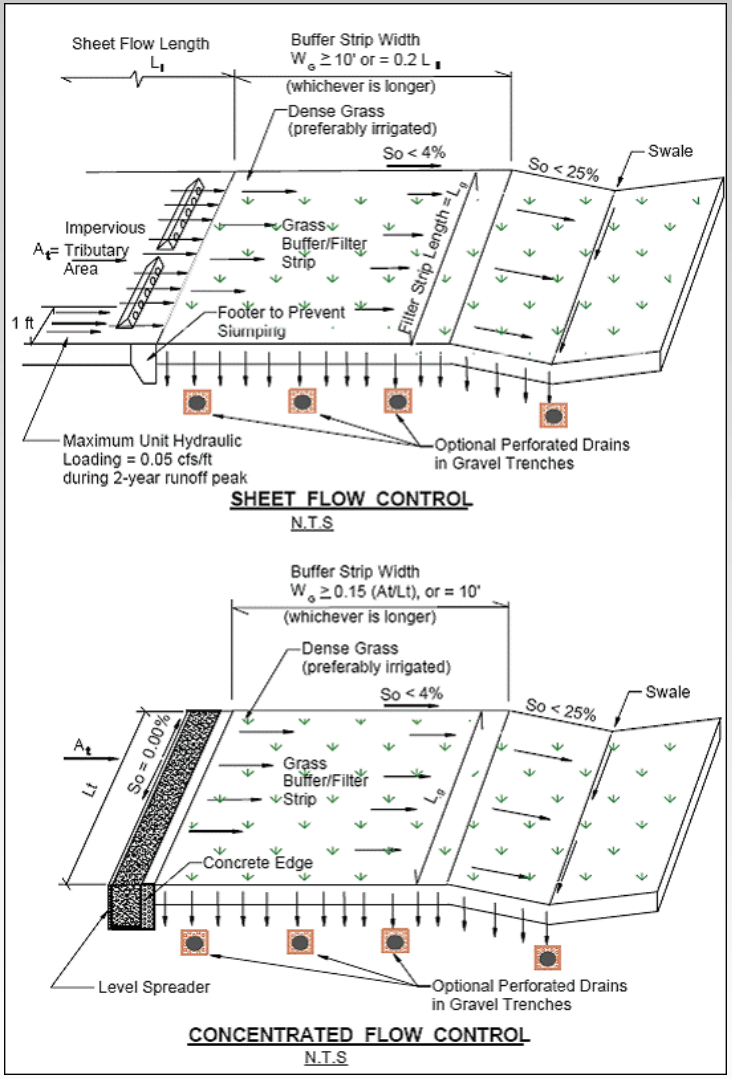
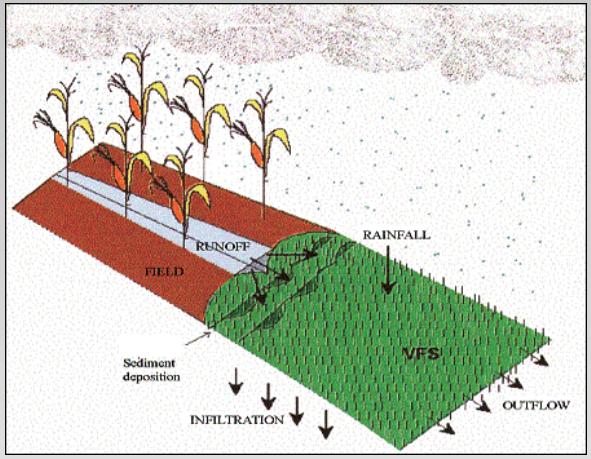
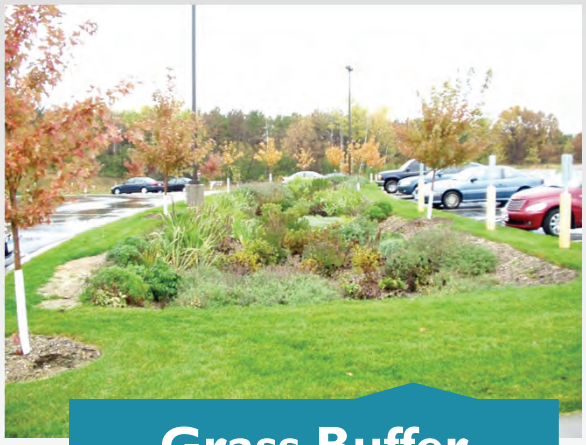
Vegetated Filter Strips







Grass Buffer Strips

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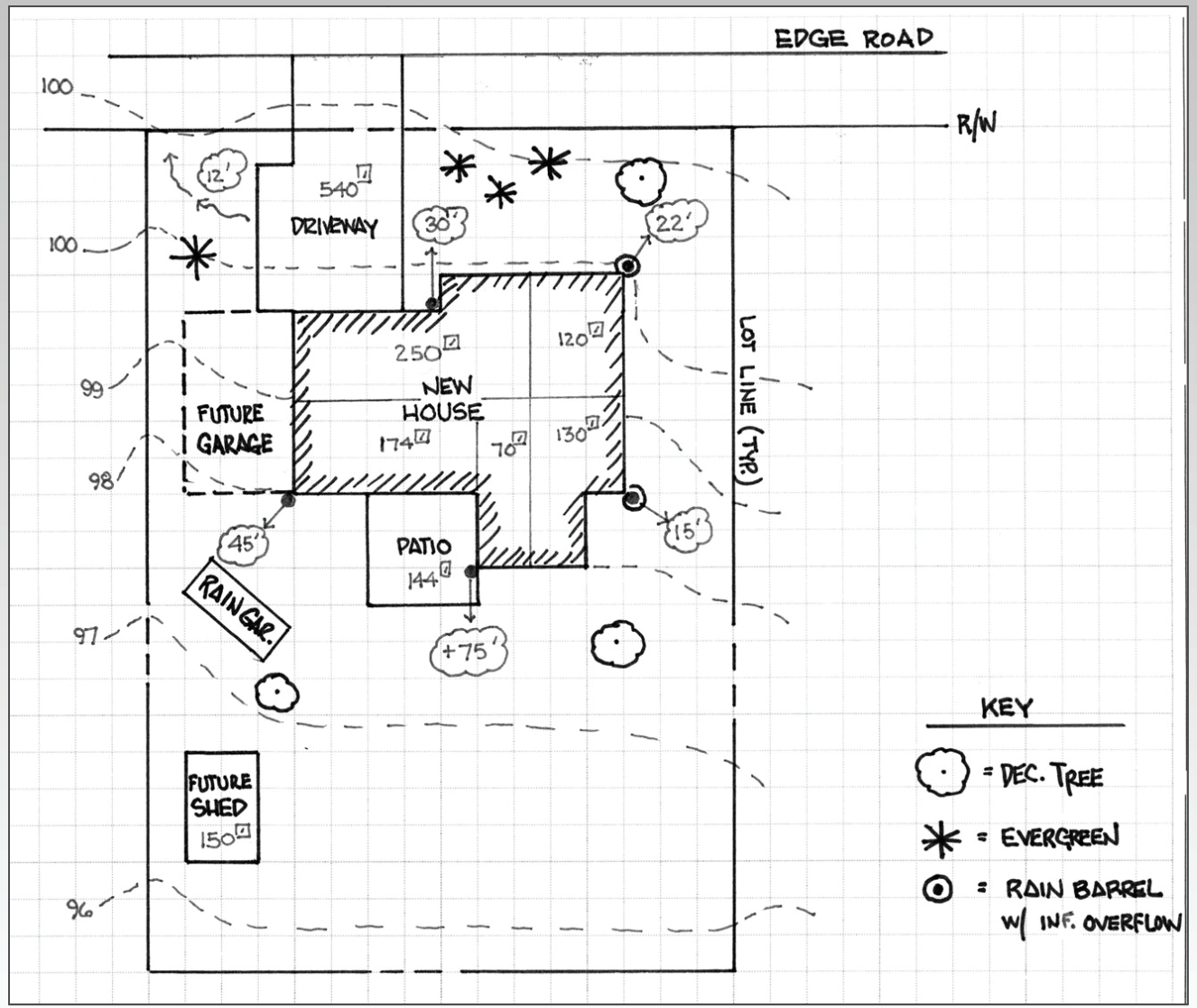
Typical Design Examples using SA

Case No. 1: New Home Construction



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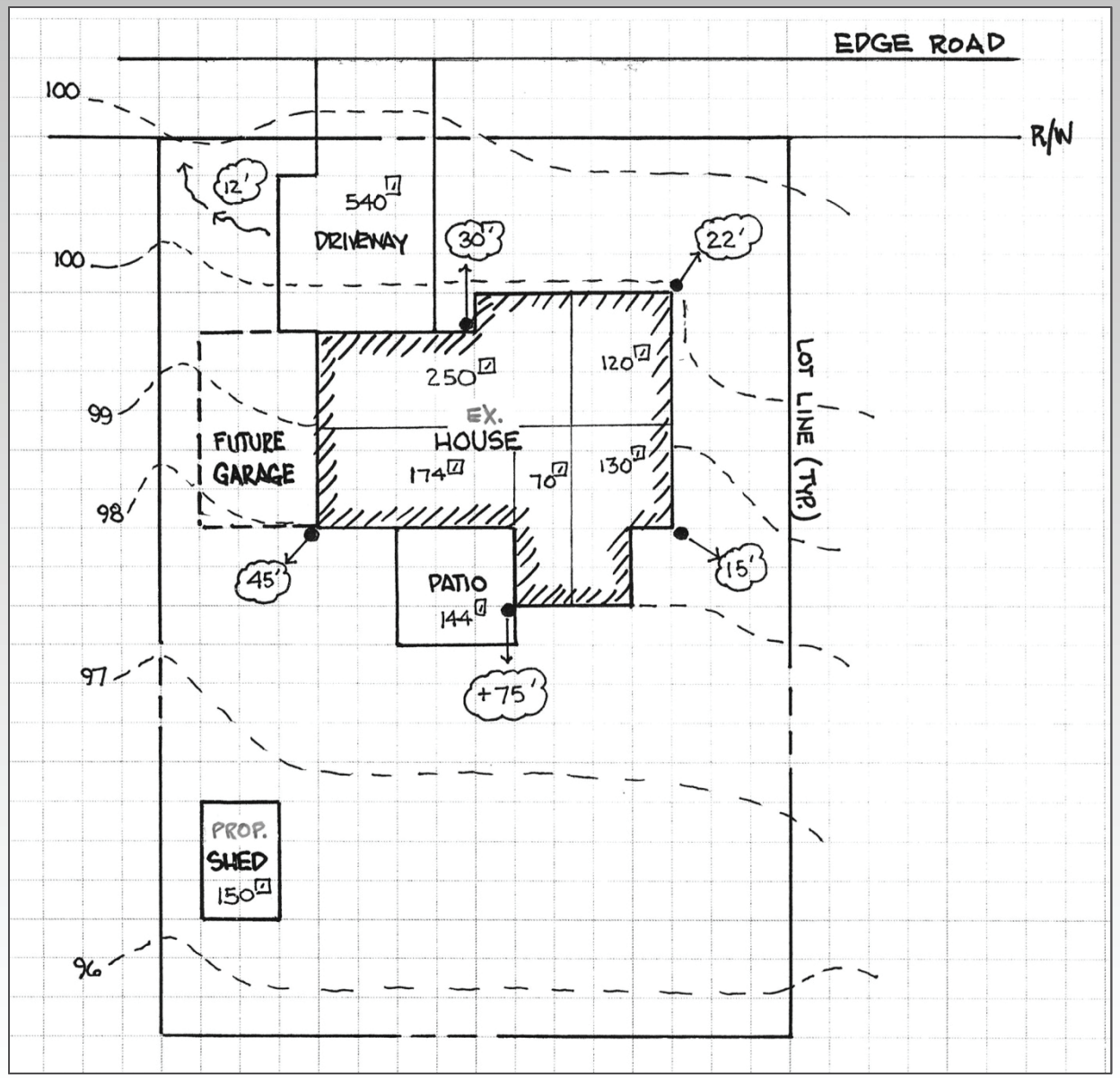
Case No. 2: Garden Shed Construction



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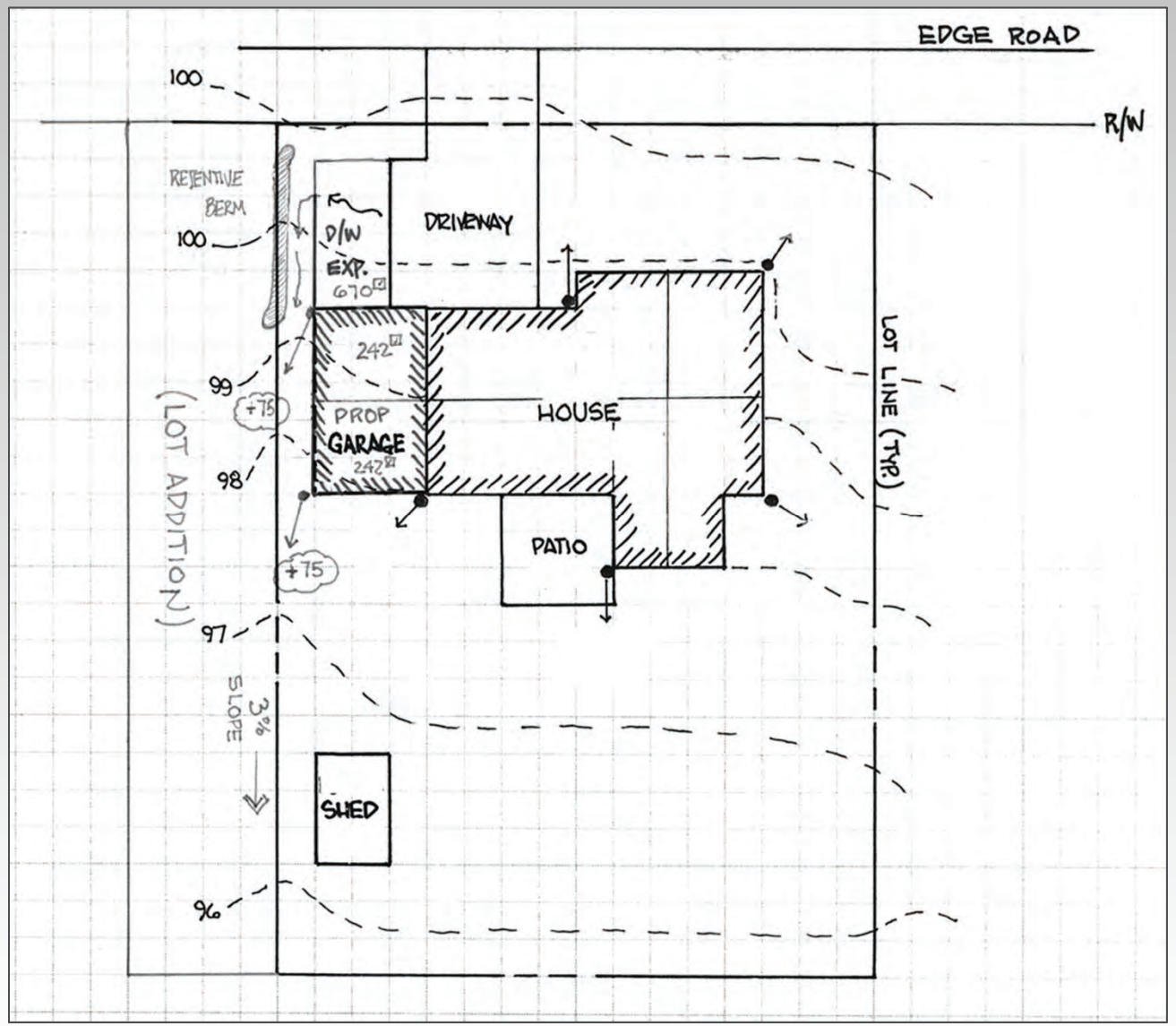
Case No. 3: Garage Addition/Driveway Expansion



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Questions

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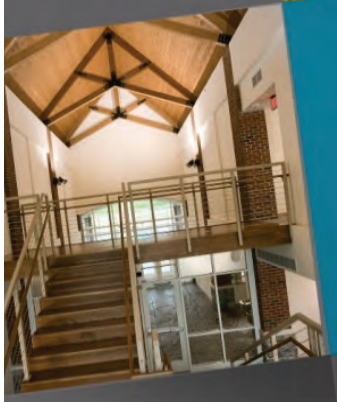

Thank You!

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