City of Chattanooga

Stormwater Regulations Seminar

Stormwater Plans Review Process

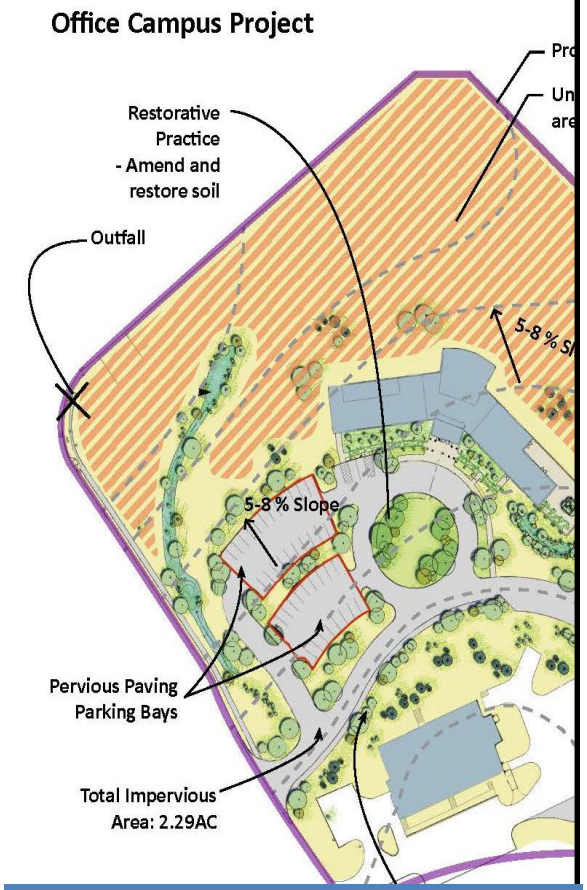
Plan Submittal Process

- **Concept Phase Submittal**
- **Preliminary Phase Submittal**
- **Final Submittal**

(Remember, this is in addition to the normal LDP Process.)

Plan Submittal Process

- **Concept Phase Submittal**



Blob Drawing

CONCEPT STORMWATER MANAGEMENT PLAN

ITEM DESCRIPTION
Existing Site Conditions Assessment Plan – 1"=100' scale maximum, showing the following
a. Property owners
b. Easements
c. Existing zoning of adjoining parcels (ref: Hamilton County GIS Zoning Layer)
d. Contours, 2' intervals (http://www.chattanooga.gov/searchresults?q=gis+maps)
e. Site Drainage
1. Water bodies (perennial and intermittent creeks, streams, springs, lakes, a ponds)
2. Riparian corridors
3. Mapped floodplains
4. Wetlands (including vegetation condition – wet meadow, shrub/scrub, and swamp)
f. Vegetation and its Condition (annotate drawing)
1. Tree canopy lines
2. Individual trees (above 6" in caliper, identify specimens)
g. Soil Types (http://websoilsurvey.nrcs.usda.gov)
1. List all soil types with descriptions
2. Indicate alluvial soils
3. Description table to include, at a minimum:
i. Permeable soils based on hydrologic soil groups
ii. Soil structure based on soil maps (% sand, silt, and clay)
h. Geologic Features
1. Karst areas/sinkholes
2. Rock outcrops
i. Manmade features including, but not limited to, buildings, parking areas, utilities, of-way, cemeteries, and burial grounds
j. Other (describe below)
Proposed Site Layout Plan – 1"=100' scale maximum, showing the following items overlai the project parcel map and site inventory map:
a. Layouts and width of the right-of-way and paving of proposed streets, alleys, and easements
b. Layout of lots showing approximate dimensions, lot numbers, and approximate ar each lot
c. Parcels of land intended to be dedicated or reserved for schools, parks, playground parking areas, common open space, or other public, semi-public or community pur
d. Any identified floodplain area or district, including limits of the 100-year flood defi FEMA
e. Propos
f. All pro
g. Propos
h. Propos
i. Constr
j. Buffer

Checklist

Project Name:	PROJECT	**WORKSHEET 1: SOV and BMP AREA**	
Date Prepared:	DATE		
Prepared by:	NAME		

=> Denotes input by user

SOV DESIGN RAINFALL =	0.5	in.
TARGET LOADING RATIO =	10	(See Ch. 5 for details)

Concept Design

Total Parcel Area =	348,480	ft.²	or	8.00 ac
Total Proposed Impervious Area =	99,844	ft.²	or	2.29 ac
Protected Areas				0.00 ac
5.2.1 Area of Protected Undisturbed and Healthy Soils	178,596	ft.²	or	4.10 ac
5.2.1.1 Area of Minimized Land Disturbance	0	ft.²	or	0.00 ac
5.2.1.2 Area of Protected Soils/Steep Slopes	0	ft.²	or	0.00 ac
5.2.2 Area of Protected Natural Flow Paths	0	ft.²	or	0.00 ac
5.2.3 Area of Protected/Enhanced Riparian Corridors	0	ft.²	or	0.00 ac
5.2.4 Area of Protected/Preserved Vegetation	0	ft.²	or	0.00 ac
Total Protected Area	178,596	ft.²	or	4.10 ac
Total Disturbed Area	169,884	ft.²	or	3.90 ac
				0.00 ac
Total Impervious Area	99,844	ft.²	or	2.29 ac
Total Pervious Area	70040	ft.²	or	1.61 ac
Concept Level BMP Area (Based on Proposed Impervious Area)	9,984	ft.²	or	0.23 ac

Disturbed Area Requiring Stormwater Management =	169,884	ft²	(A)
=	3.90	ac	

Runoff Coefficients, Rv for Design Rainfall

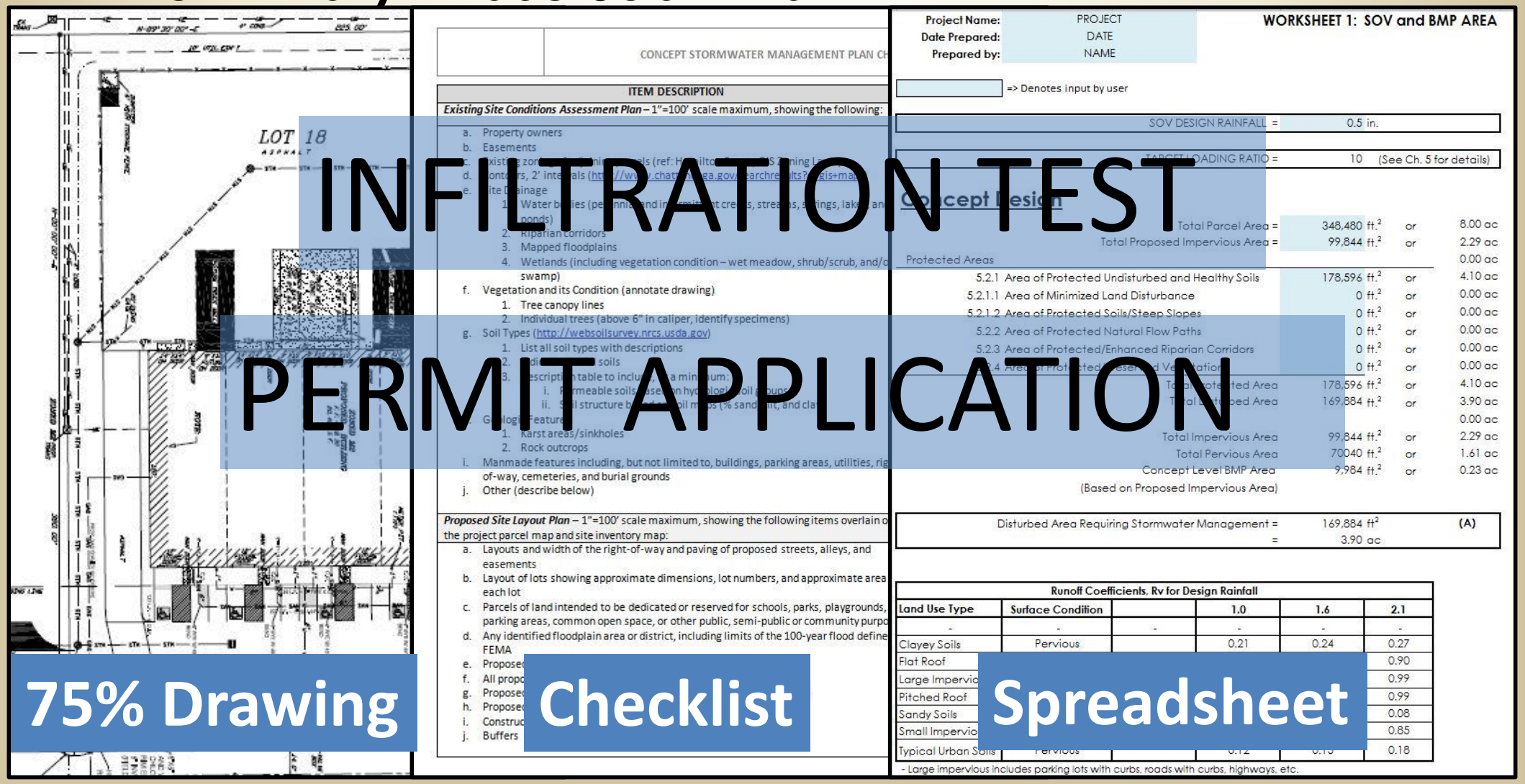
Land Use Type	Surface Condition		1.0	1.6	2.1
-	-	-	-	-	-
Clayey Soils	Pervious		0.21	0.24	0.27
Flat Roof					0.90
Large Impervio					0.99
Pitched Roof					0.99
Sandy Soils					0.08
Small Impervio					0.85
Typical Urban Soils	Pervious		0.12	0.15	0.18

- Large impervious includes parking lots with curbs, roads with curbs, highways, etc.

Spreadsheet

Plan Submittal Process

- **Preliminary Phase Submittal**



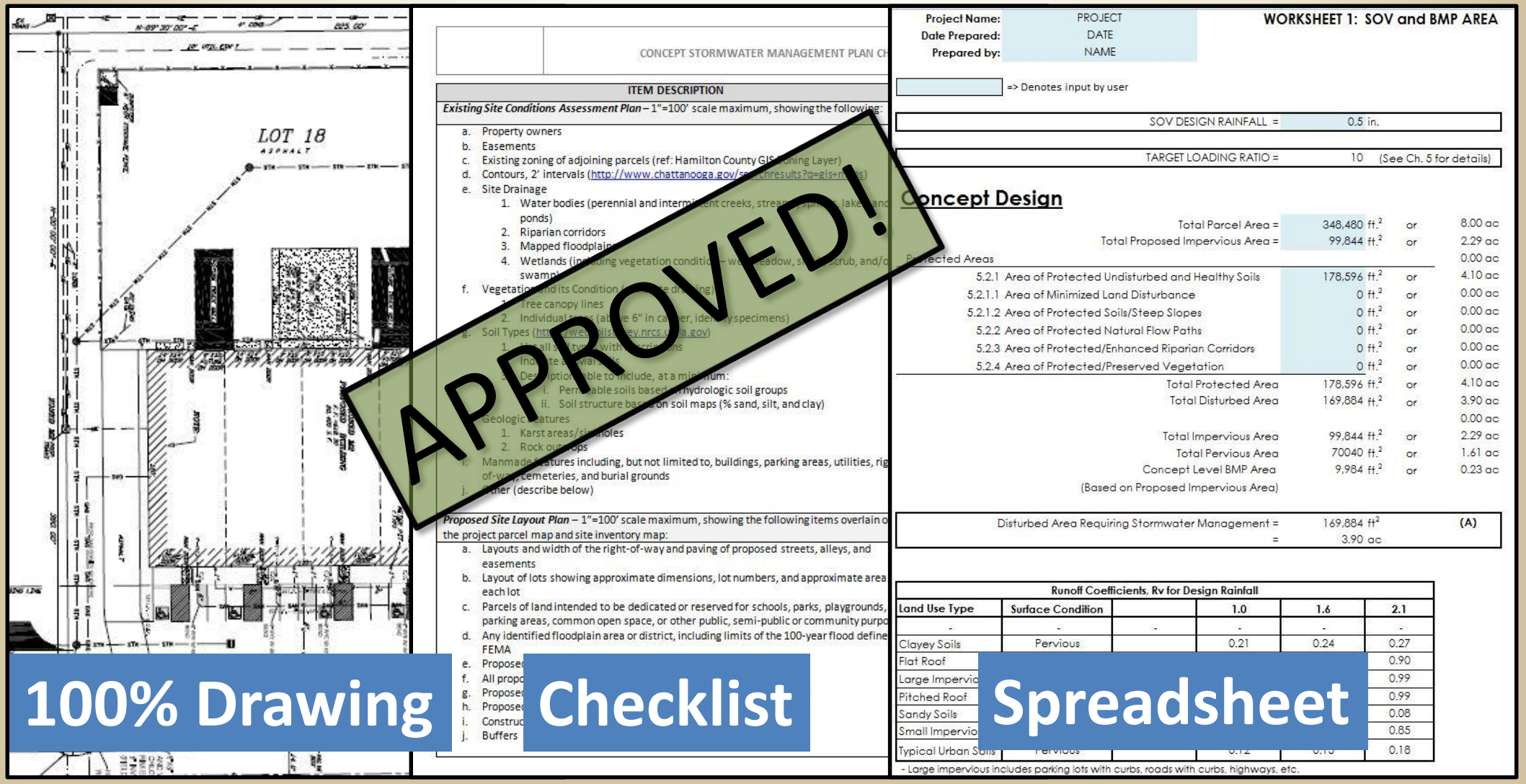
INFILTRATION TEST

PERMIT APPLICATION

75% Drawing **Checklist** **Spreadsheet**

Plan Submittal Process

- **Final Submittal**



Plan Submittal Process

- **Concept Submittal**
  - **Desktop review and Concept Drawing**
  - **Face to Face meeting w/ LDO**
  - **Developer/Engineer leaves with review comments**
- **Preliminary Phase Submittal**
  - **Preliminary Engineering Drawings and meeting w/ LDO**
  - **Preliminary SW Calculations/soil tests**
  - **Developer/Engineer leaves with review comments**
- **Final Submittal**
  - **Final Engineering drawings**
  - **Review & Approval by LDO**

As-Built Drawings

- **What information is required?**
- **When & Why is it required?**
- **Who is responsible for providing the information?**
- **Why is this different than in the past?**

As-Built Drawings

- **What information is required?**

"As Built Plans" means drawings depicting structures, facilities, systems, landscaping, and site conditions as they were actually installed and constructed.

- Drainage Structure Number;
- Drainage Structure Label (ex: oil skimmer, water quality unit type/model, etc.);
- Northing, Easting, and Rim Elevation;
- Invert Elevations;
- Size, Material, and Direction of flow for each pipe entering and leaving the drainage feature;
- Detail drawings of water quality features including but not limited to profiles, contours, and elevations (ex: bio-retention areas, swales, grass filter strips, etc.).

As-Built Drawings

- **Why is it required?**
  - **The City is required by TDEC to maintain an inventory of all stormwater infrastructure within the MS4 boundaries, and to inspect WQ BMP's on a regular basis.**
- **When is it required?**
- **In a nutshell – PRIOR TO A CERTIFICATE OF OCCUPANCY BEING ISSUED.**

As-Built Drawings

- **Who is responsible for providing the information?**
- As Built Plans must show the final design specifications, meet the criteria in the RMG and per City requirements, and be sealed by a registered **professional engineer**, **registered land survey**, or **registered landscape architect** licensed in Tennessee.
- Typically, there is a note on the construction drawings that makes the **contractor** responsible for retaining the services of a licensed professional to perform this task.

As-Built Drawings

- **Why is this different than in the past?**

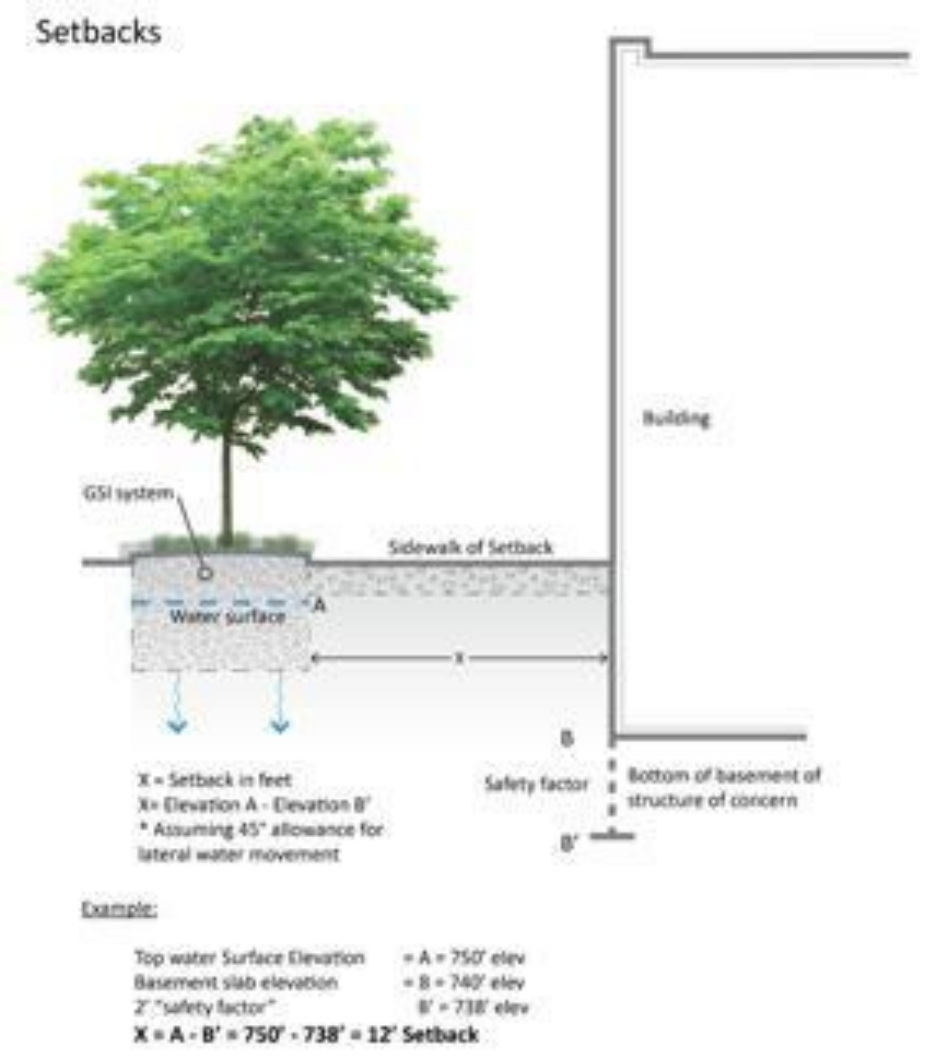
- Actually, it isn't that different, except that some of the BMP's we will be using will be different and may require different data collection techniques.

As-Built Drawings and Engineer's Certification

- Survey shots must be taken during construction.
- If you cannot survey *after* installation, then you must survey *during* installation.
- Survey data must be provided on the as-built drawings.
- Engineer must certify that the BMP has been installed properly.
- SOV will be based on as-builts and actual infiltration rates, not just design drawings and calculations.

Some Common Problems We See in Reviewing Plans

Inadequate distance between buildings and BMPs (see RMG, Appendix "A" (Protocol 1).



Some Common Problems We See in Reviewing Plans

Inadequate stream buffers.

Measure from stream bank, not center of stream.

- 30’ – Less than 1 sq. mile drainage area and not impaired or high-quality
- 60’ – 1 sq. mile drainage area or impaired or high-quality

Some Common Problems We See in Reviewing Plans

Does not meet 72-hour maximum drawdown time (see the next to the last column in Worksheet 3).

B	C	D	E	F	G	H	I	J	K	L	M	N
Project Name:	PROJECT										**WORKSHEET 3: BMP SIZING**	
Date Prepared:	DATE											
Prepared by:	NAME											
	=> Denotes input by user											

Sub-Drainage ID	BMP Type	Infiltration Rate (in./hr)	Runoff Storage Type	Mid-height Area (ft^2)	Depth of Storage (ft)	Storage Capacity (%)	Storage Volume (ft^3)	BMP Surface Area (ft^2)	BMP Capture Volume (ft^3)	Net Drainage Area SOV (ft^3)	Drawdown Time (hrs)	Loading Ratio
1	**Bioretention**	0.40	Surface	1,200	1	100%	1,200	1,200	1,680	1574	42	8
			Soil	1,200	2	20%	480					
			Stone			0%	0					
2	**Infiltration Bed**	0.40	Surface			0%	0	10,000	6,000	5512	18	5
			Soil			0%	0					
			Stone	10,000	1.5	40%	6,000					
3	**Self-Managing Pervious Pavement**	0.40	Surface			0%	0	4,000	533	421	4	1
			Soil			0%	0					

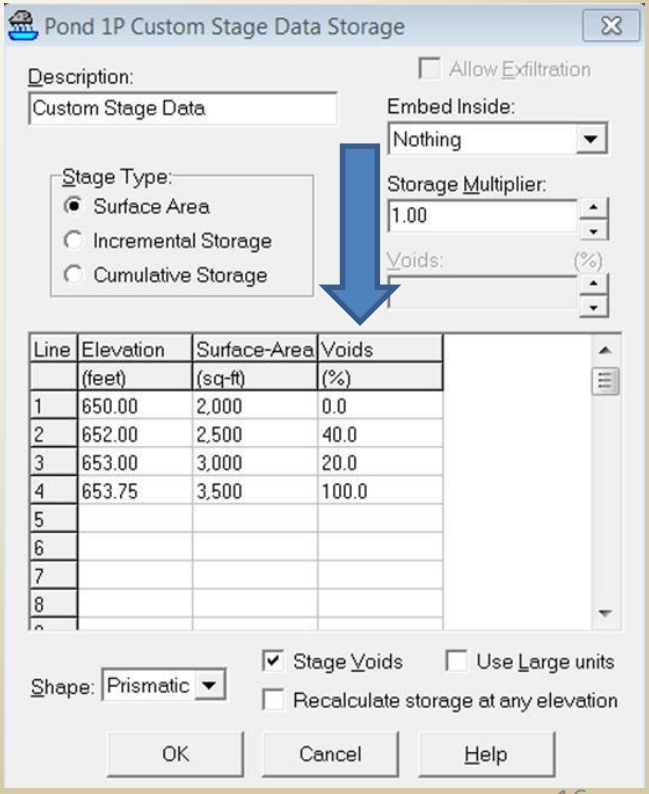
Some Common Problems We See in Reviewing Plans

May use either adjusted CNs, or model actual BMPs, but not both (otherwise, this would be "double-dipping").

LID Spreadsheet – Worksheet 4, Last Column

MP e on	Q minus Total Volume Reduction (in)	Adjusted CN
	0.39	54
	1.11	61
7	1.66	64
	2.50	67
	3.83	69

HydroCAD - Technique for Modeling Actual BMPs (Stage Voids); Other Programs May Be Used in a Similar Manner.



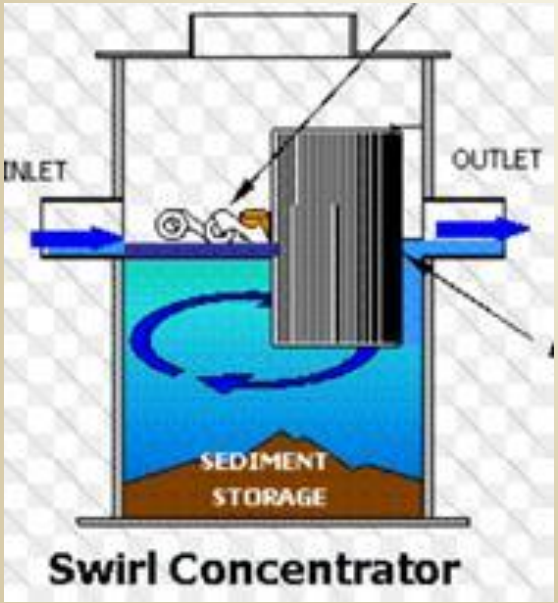
Some Common Problems We See in Reviewing Plans

Only volumes below an underdrain (if there is one) may count toward SOV. Volumes above may count toward peak flow reduction. Your calculations should reflect this.

Some Common Problems We See in Reviewing Plans

Paved bypass areas or off-site mitigation will require 80% TSS removal at 2.1" rainfall at your site.

AquaShield



Belgard

Contech

Some Common Problems We See in Reviewing Plans

Other common issues include:

- Plans that are inadequate or unbuildable.
- Plans and calculations do not match (especially on outlet control structures).
- Ditches/streams with drainage areas over 50 acres must computed and certified flood elevations using FEMA approved methodology.
- Plans submitted before Dec. 1, 2014, may not be considered "grandfathered" if significant changes are made to the layout.

Advice on Getting Your Project Design Approved As Quickly As Possible

- Design with the Rainwater Management Guide. Most engineering firms have had no problem with it (including the first one to go completely through it).
- Make all necessary revisions.
- Be clear and professional in your communications.
- Understand we try to be fair to everyone.
- We truly want your project to be approved correctly, quickly, and easily.

Questions?