City of Columbia BMP Manual

Better Site Planning / Design
& Volume Reduction

February 13, 2013

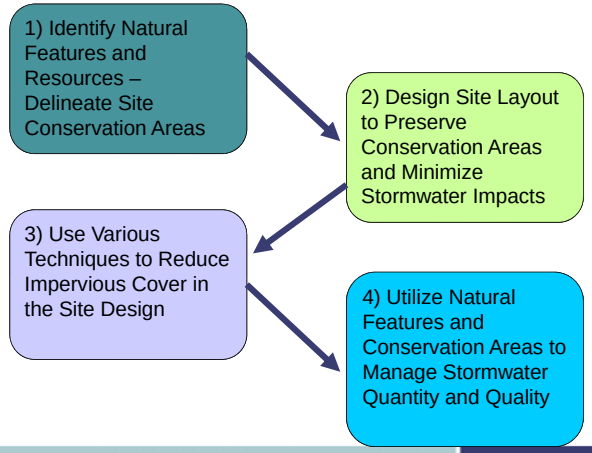
Better Site Planning/Design

Stormwater Better Design Practices and Techniques

- Less impervious cover
- Natural areas are conserved
- Stormwater pollution is minimized

Goals of Stormwater Better Site Design

- Control Quantity & Quality at the Source
- Utilize Simple, Nonstructural Methods
- Creating a Multifunctional Landscape
- Utilizing Hydrology as a Framework



Conservation of Natural Features & Resources

- Preserve Undisturbed Natural Areas
- Preserve Riparian Buffers
- Avoid Floodplains
- Avoid Steep Slopes
- Minimize Siting on Porous/Erodible Soils

Lower Impact Site Design Techniques

- Fit the Design to the Terrain
- Reduce Clearing and Grading
- Locate in Less Sensitive Areas
- Utilize Open Space Development
- Consider Creative Development Design

Reduction of Impervious Cover

- Reduce Roadway Lengths and Widths
- Reduce Building Footprints
- Reduce Parking Footprints
- Reduce Setbacks and Frontages
- Use Fewer or Alternative Cul-de-sacs

Reduction of Impervious Cover

Reduce the Parking Footprint

Reduce the Parking Footprint

Reduce the Building Setback

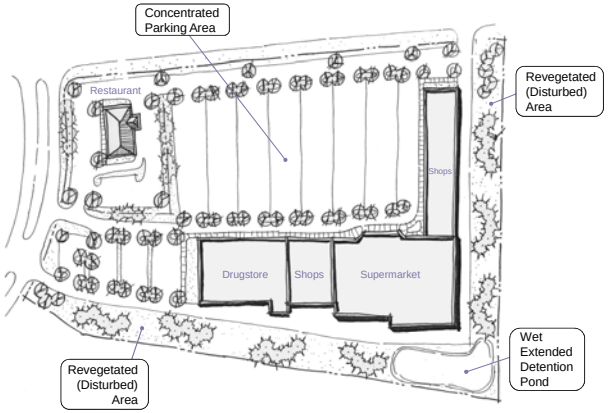
Utilize Natural Features

- Buffers and Undisturbed Areas
- Natural Drainageways
- Vegetated Swales, less C&G
- Drain Runoff to Pervious Areas

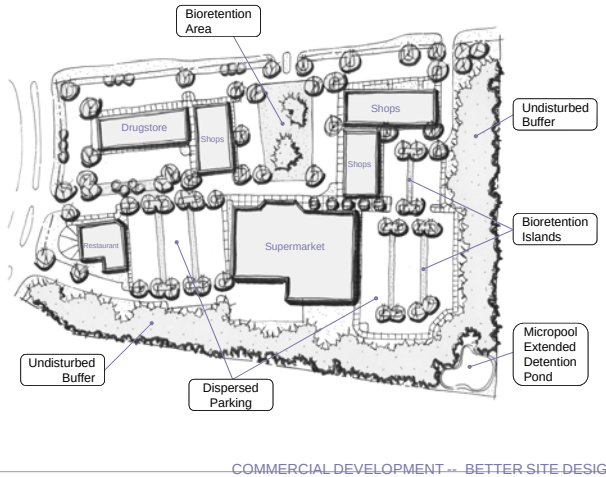
Stormwater Better Site Design Examples

RESIDENTIAL SUBDIVISION #2 -- CONVENTIONAL DESIGN

RESIDENTIAL SUBDIVISION #2 -- BETTER SITE DESIGN



COMMERCIAL DEVELOPMENT -- CONVENTIONAL DESIGN



COMMERCIAL DEVELOPMENT -- BETTER SITE DESIGN

Benefits of Better Site Design

- Reduced construction costs
- Increased property values
- More open space for recreation
- More pedestrian friendly neighborhoods
- Protection of sensitive forests and habitats
- Naturally attractive landscape

Stormwater Site Design Credits

Site Design Stormwater Credits

They reduce the size and cost of structural stormwater controls for developers

Practices That Provide Credits

- Natural Area Conservation
- Stream Buffers
- Use of Vegetated Channels
- Overland Flow Filtration/ Infiltration Zones
- Environmentally Sensitive Large Lot Subdivisions

Application of Credits

- Meet or reduce WQv requirements.
- Help to meet larger storm requirements
  - increasing times of concentrations
  - reducing imperviousness

Credit #1 Natural Area Conservation

Rule: Subtract conservation areas from total site area when computing water quality volume requirements.

Credit #1…

Example: Residential Subdivision

Area = 38 acres, Natural Cons. Area = 7, Imperv. Area = 13.8

Rv = 0.05 + 0.009 (I) = 0.05 + 0.009 (36.3%) = 0.37

Credit: 7.0 acres **in** natural conservation area

New drainage area = **38** – 7 = **31** acres

Before credit: WQv = (1.2)(0.37)(38)/12 = **1.40** ac-ft

With credit: WQv = (1.2)(0.37)(31)/12 = **1.15** ac-ft

(**18 % reduction** in water quality volume)

Credit #2
Stream Buffers

Rule: Subtract areas draining via overland flow to the buffer from total site area when computing water quality volume requirements.

Credit #2…

Example: Residential Subdivision

Area = 38 acres, Impervious Area = 13.8 acres

Area Draining **to** Buffer = 5 acres

Rv = 0.05 + 0.009 (I) = 0.05 + 0.009 (36.3%) = 0.37

Credit: 5.0 acres draining to buffer

New drainage area = **38** – 5 = **33** acres

Before credit: WQv = (1.2)(0.37)(**38**)/12 = **1.40** ac-ft

With credit: WQv = (1.2)(0.37)(**33**)/12 = **1.22** ac-ft

(**13% reduction** in water quality volume)

Credit #3
Use of Vegetated Channels

Rule: Subtract the areas draining to a grass channel from total site area when computing water quality volume requirements.

Credit #3…

Example: Residential Subdivision

Area = 38 acres

Impervious Area = 13.8 acres

Rv = 0.05 + 0.009 (I) = 0.05 + 0.009 (36.3%) = 0.37

Credit: 12.5 acres drains **to** grass channel

New drainage area = **38** – 12.5 = **25.5** acres

Before credit: WQv = (1.2)(0.37)(**38**)/12 = **1.40** ac-ft

With credit: WQv = (1.2)(0.37)(**25.5**)/12 = **0.94** ac-ft

(**33%** reduction in water quality volume)

Credit #4
Overland Flow Filtration Infiltration Zones

Rule: Impervious areas that are disconnected can be deducted from total site area when computing the water quality volume requirements.

Credit #4…

Criteria:

- Hydrologic group A or B soils
- No hotspot runoff
- Maximum contributing flow path of 75 ft
- Downspouts 10 ft from impervious
- Disconnection to property line or control
- Length of flow >= contributing length
- Entire flow path <= 3%
- Maximum contributing impervious area (at single point) is 5,000 ft^2

Credit #4…

Example: Commercial Site

Area = 3.0

Impervious Area = 1.9 acres (or 63.3% impervious cover)

"Disconnected" Impervious Area = 0.5 acres

Rv = 0.05 + 0.009 (I) = 0.05 + 0.009 (63.3%) = 0.62

Credit: 0.5 acres of disconnected imperviousness

New drainage area = **3** – 0.5 = **2.5** acres

Before credit: WQv = (1.2)(0.62)(**3**)/12 = **0.19 ac-ft**

With credit: WQv = (1.2)(0.62)(**2.5**)/12 = **0.15 ac-ft**

(**21% reduction** in water quality volume)

Credit #5

Environmentally Sensitive Large Lot Subdivisions

Rule: Targeted towards large lot subdivisions (e.g. 2 acre lots and greater).

The requirement for structural practices to treat the water quality volume treatment requirements shall be **waived**.

Credit #5…

Criteria:

- Total impervious cover footprint < 15%
- Lot areas should be at least 2 acres, unless clustering is implemented
- Grass channels should be used to convey runoff versus curb and gutter (see Credit #3)
- Overland flow filtration/infiltration zones should be established (see Credit #4)

Questions?