

Storm Water Controls and Flow / Pollution Control Processes

Category	Primary Function	Subcategory	Types of Controls	Regional Control	Storm Water Controls and Flow / Pollution Control Processes																Planning Considerations	Critical Design Criteria	Maintenance and Access Considerations								
					Hydrologic Processes				Pollution Prevention Processes				Physical Treatment Processes				Chemical Treatment Processes							Biological Treatment Processes				Resource Protection Processes			
					Infiltration	Evapotranspiration	Conveyance / Diversion	Peak Attenuation	Reuse	Segregation	Use Restrictions	Cleanup	Erosion Control	Sedimentation	Floatation	Flocculation	Filtration	Sorption	Precipitation	Destabilization				Bioretention	Biosedimentation	Bioinfiltration	Stream Stabilization	Habitat Restoration	Use Separation	Shading	
Runoff Source Control	Change the runoff characteristics at the point where rainfall contacts the surface	Eliminate Impervious Surfaces	Narrower Roadways	X	P	S																			Requires coordination with other site planning issues	None	None				
			Smaller Parking Lots	X	P	S																									
			Open Space Preservation	X	P	S																									
			Density Controls	X	P	S																									
		Pervious Area Management	Minimize Soil Compaction	X	P																										
			Amend Soils	X	P																										
		Vegetation Management	Protect Existing Vegetation	X		P																									
			Promote Native Vegetation	X		P																									
			Tree Replacement	X		P																									
		Permeable Pavements / Roofs	Porous Concrete	X	P							X		X	X				X								Typically for infiltration of incident rainfall only, avoid use in travel lanes	Rock reservoir under pavement, underdrain if soils unable to infiltrate entire WQv	Subject to frequent clogging, needs vacuum sweeping		
Porous Asphalt	X		P							X		X	X	X			X														
Open Cell Pavers	X		P	S						X		X	X	X			X	X													
Vegetated Roofs	X		P	S						X		X	X	X			X	X													
Pollutant Source Control	Minimize contact of pollutants with storm water	Segregation	Roofs	X		P		P																	Must coordinate with building, plumbing, fire code requirements	Use diversions, berms, etc to direct WQv away from site	"Dry" cleaning methods within enclosures / containments				
			Enclosures	X		P		P																							
			Containments	X		P		P																							
		Material and Waste Management	Proper use and disposal	X				P																		Effectiveness may depend on market place, national / regional regulation	None	Requires education of public and employees, point-of-sale considerations			
			Product reformulation	X				P																							
		Cleanup	Pavement cleaning	X				P																		Cleaning frequency / response must be consistent with climatic conditions to maximize effectiveness	None	Requires education, proper equipment			
			Drainage System Cleaning	X				P																							
Spill control	X					P																									
Runoff Conveyance / Diversion	Direct impervious area runoff to a control system	Diversions	Disconnect Downspouts	X		P		P																Used to direct / convey runoff to another control suitable for site conditions.	Typically sized to minimize frequency of exposure to pollutant sources and/or to be consistent with downstream control facility design. Diversions to pervious surfaces must be non-erosive.	Remove blockages that could cause flooding.					
			Direct Runoff Away from Pollutant Sources	X		P		P																							
			Direct Impervious to Pervious Surfaces	X		P		S																							
			Sewer Separation	X		P		P																							
		Conveyance	Curbs, Gutters, & Inlets	X		P						S													Used to direct / convey runoff to another control suitable for site conditions. Also used to protect against erosion, dissipate erosive velocities, protect steep slopes.	Typically sized for large, less frequent storm events	Remove blockages that could cause flooding.				
			Storm Sewers	X		P						S																			
			Vegetated Channels	X		P						S																			
			Paved / Rock-lined Channels	X		P						P																			
Outfall Protection	X								P										X												

**Managed Impervious Area -- Total Combined Sewer Area
Scenario ____:**

Water Quality Volume Scenarios

WQv

- A. Ohio EPA Post-Construction Permit
- B. USEPA CSO Control Policy
- C. Philadelphia / eastern Pennsylvania
- D. Other CSO Programs??

Runoff from 0.75 inches precipitation
0.38 inches if area 50% impervious
Runoff from 1.00 inches precipitation

Land Use / Impervious Area Type	Number of Properties	Area (Acres)	Percent of Land Use	Average Per Property (sq ft)	Retrofit / Renovation			Tear Down / Redevelopment			
					Percent of Service Area	Managed Impervious Area		Percent of Service Area	Managed Impervious Area		
						Percent	Area (Acres)		Percent	Area (Acres)	
Single Family Residential	103,726	19,746	100.0%								
Rooftops		2,851	14.4%	1,197	90%	10%	256.6	10%	50%	142.6	
Other Impervious		2,094	10.6%	879							
Pervious		14,801	75.0%	6,216							
Multi-family Residential	52,998	10,004	100.0%								
Rooftops		1,165	11.6%	958	80%	10%	93.2	20%	80%	186.4	
Parking		1,521	15.2%	1,250		10%	121.7		80%	243.3	
Other Impervious		380	3.8%	312							
Pervious		6,938	69.4%	5,702							
Commercial	16,827	5,224	100.0%								
Rooftops		985	18.9%	2,550	70%	25%	172.4	30%	80%	236.4	
Parking		1,622	31.1%	4,200		25%	283.9		80%	389.4	
Other Impervious		406	7.8%	1,050							
Pervious		2,211	42.3%	5,724							
Industrial	7,571	4,552	100.0%								
Rooftops		1,272	27.9%	7,318	60%	10%	76.3	40%	80%	407.0	
Parking		1,674	36.8%	9,634		10%	100.5		80%	535.8	
Other Impervious		419	9.2%	2,408							
Pervious		1,187	26.1%	6,829							
Institutional / Public	30,516	12,730	100.0%								
Rooftops		698	5.5%	996	50%	10%	34.9	50%	80%	279.2	
Parking		2,322	18.2%	3,315		10%	116.1		80%	929.0	
Other Impervious		581	4.6%	829							
Pervious		9,129	71.7%	13,031							

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Parks / Open Space	489	800	100.0%							
Other Impervious		71	8.9%	6,325	40%			60%		
Pervious		729	91.1%	64,939						
Arterial Roadways		5,000	100.0%							
Roadway		2,130	42.6%		30%	10%	63.9	70%	10%	149.1
Other Impervious		1,000	20.0%							
Pervious		1,870	37.4%							
Local Roadways		8,000	100.0%							
Roadway		3,156	39.5%		20%	50%	315.6	80%	80%	2019.8
Other Impervious		2,000	25.0%							
Pervious		2,844	35.6%							
Total Area	212,127	66,056	100.0%							
Rooftops		6,971	10.6%				633			1,252
Parking		7,140	10.8%				622			2,097
Roadway		5,286	8.0%				380			2,169
Other Impervious		6,950	10.5%				0			0
Pervious		39,709	60.1%				0			0