

## **Appendix 3 Stormwater Engineering Specifications for Design Professionals**

### **I. Content of Stormwater Concept Plan:**

- A. A Stormwater Concept Plan (SCP), if required, shall include sufficient information to evaluate the environmental characteristics of the project site, the potential impacts of the proposed development on water resources and the effectiveness and acceptability of measures proposed for managing stormwater runoff. Sufficient engineering analysis shall be performed and provided to show that the stormwater control measures in the Plan are viable and capable of managing runoff from the site in compliance with these regulations and the municipality's Stormwater Management Plan and Regulatory Program. All anticipated development of the site and phases of the project, both present and future, shall be addressed in the SCP. The intent of this conceptual planning process is to determine the type of stormwater measures necessary for the proposed project. The SCP shall include any modifications to the proposed project necessary to achieve the required level of stormwater management. In order to ensure adequate planning for management of runoff from future development, a municipality may also require any SCP to consider the maximum development potential of a site under existing zoning, regardless of whether the applicant presently intends to develop the site to its maximum potential.
- B. For development or redevelopment occurring on a site where development has previously occurred, an applicant shall be required to include within the stormwater concept plan measures for controlling existing stormwater runoff discharges from the site in accordance with the standards of this Ordinance to the maximum extent practicable. Such measures shall also include those measures reasonable and necessary to, at a minimum, infiltrate the runoff from the first one-half inch of precipitation from any storm event for all areas within the site, which have previously been developed.

### **II. Content of the Storm Water Control Report**

A Stormwater Control Report (SCR) shall be submitted which evaluates the quantity and quality of stormwater runoff resulting from the proposed project for all phases, both present and future, and if required, for the maximum potential runoff from the site if it were to be developed to its maximum potential under existing zoning. The Stormwater Control Report shall be consistent with, and shall be reviewed on the basis of the approved SCP. Contents of Stormwater Control Report (SCR). A SCR shall contain, at the minimum, the following information:

- A. A description of the project site and surrounding area within five hundred (500) feet as it exists prior to the commencement of the project; a location map; description of the watershed of the subcatchment and its relation to the project site; soil types and descriptions on the site and surrounding area; topography of the project site and surrounding area; surface characteristics including percent cover by asphalt, concrete, crushed stone, grasses, brush, and trees; current land use including all structures, and characteristics of the shoreline and its development, if applicable; drainage patterns including streams, ponds, culverts, ditches, and wetlands; and locations of utilities, roads, and easements.
- B. A detailed description of the proposed project including surface characteristics; proposed land use with tabulation of the percentage of surface area to be adapted to various uses; drainage patterns; locations of utilities, roads and easements; the limits of clearing and grading; and construction cost estimates of stormwater management structures.
- C. Hydrologic and hydraulic computations of stormwater volume and flow for existing and proposed conditions shall be performed. Such computations shall include:
  - 1. Description of the design storm frequency, intensity and duration

2. Time of concentration
  3. Soil curve numbers or runoff coefficients
  4. Peak runoff rates and total runoff volumes for each watershed area or subcatchment area
  5. Infiltration rates
  6. Culvert capacities
  7. Flow velocities
  8. Data on the increase and volume of runoff for the 10-year storm and on the change in the rate of runoff from the 2, 10' 50, and 100 year storms
  9. Documentation of sources for all computation methods and field test results
  10. Sufficient information to demonstrate that the proposed development, with its necessary stormwater controls, has been designed to preserve and maintain the base flow in all streams passing through, adjoining or receiving runoff from the site.
- D. A description of how the stormwater control measures for the project will provide the best available pollutant removal technology.
- E. A detailed description of, and plans of, stormwater and erosion control measures including:
1. Proposed containment facilities and structures
  2. Calculations of infiltration area required
  3. Calculation of retention and/or detention/retention storage requirements and storage volume provided
  4. Calculation or documentation of infiltrations rate
  5. Calculation for release rate controls (orifice or pipe size)
  6. Description of pollution control measures such as filter strips, sand, filters, and/or infiltration
  7. Provision for emergency overflow
  8. Measures taken to obviate or reduce the need for runoff control such as use of porous pavement or crushed stone, or the minimization of land clearing or paving.
- F. Drainage maps at a scale specified by the municipality showing existing and proposed conditions and contours, including the watershed area and subcatchment boundaries, acreage, inlet and outlet points of streams, culverts and drainage ditches, surface features, existing and proposed structures, buildings, pavement, flow directions, existing and proposed storm sewers, streams and other drainage channels, water quantity and quality control structure including retention basins and infiltration trenches, and a location map at a scale specified by the municipality showing the entire watershed area and indicating the project site.
- G. A certification that the stormwater control measures as designed and presented in the SCR will function adequately, will not adversely affect adjacent or downstream waters or properties, and has been designed in accordance with this Ordinance. The report and plans shall bear the stamp and signature of the licensed professional engineer or architect or exempt land surveyor executing the above certification.
- H. A project schedule which shall indicate the proposed starting and completion dates for all major work phases including but not limited to clearing and grading, road construction, utility placement, septic systems, stormwater control measures, wharf construction, pouring or laying of footings and foundations, building construction, and interim and permanent revegetation. Particular emphasis shall be placed on those elements of the schedule relating to stormwater runoff and erosion control. In general, the control facilities shall be installed first in the construction stages of a project to minimize the impacts associated with construction. Further, the project schedule shall take into account appropriate seasonal limitations for temperature and weather sensitive operations. Special

measures or procedures may be required to undertake land disturbance activities occurring between October 15 and April 15. A.

I. A maintenance schedule, which includes:

1. The construction costs related to stormwater control
2. The proposed stormwater control maintenance program and annual costs of implementing such
3. Identification of the party or parties responsible for maintenance of the system over the life of the project
4. A copy of any maintenance agreement (see Appendix 4)
5. Identification of the party or parties responsible for correcting failures or inadequate function of stormwater control measures and responsible for assuming control of the systems in the event of failure to properly maintain the system.

Each application shall contain the written consent of the landowner that the municipality may conduct site inspections, tests, and evaluations as are deemed necessary by the municipality to verify site data contained in the application. Such data shall include, but is not necessarily limited to soil type, topography, depth to seasonal high groundwater, depth to bedrock and distance from bodies of water. During the site inspection one or more deep test holes and percolation test may be required by the municipality to be performed by the applicant.

### **III. Methodologies For Determining Runoff Volumes**

Stormwater volumes and rates of flow shall be calculated using the following methods:

- A. For small watershed areas (up to 20 acres), the Rational Method may be used
- B. For larger watershed areas (up to 2,000 acres), and as the overall preferred method, The United States Department of Agriculture Method shall be used, (this method described in "Urban Hydrology for Small Watersheds- Technical Release 55")
- C. Any other equivalent and widely accepted method may be used.

### **IV. Soil Evaluation Methods**

The design infiltration rate shall be based on the results of hydrogeologic studies performed by the applicant during preparation of the Stormwater Control Report. The studies shall include test pits or borings located to present a clear picture of geologic and hydrologic conditions existing at the site and the areas, both on and off the site, affecting, or to be affected by, the development. A minimum of three subsurface excavations shall be conducted and the results shall be included in the SCR. Interpretive logs of all excavations shall be submitted with the report. Hydrogeologic interpretations and conclusions shall be developed by qualified persons only. Following design of infiltration devices, additional subsurface investigations to confirm soil and groundwater conditions will be required in the areas proposed for infiltration devices. The design of any project or development shall ensure that the ability to manage stormwater is not affected by the placement of structures on those soils or locations best suited for stormwater management purposes.

## Comparative Pollutant Removal of Urban BMP Designs Chart

COMPARATIVE POLLUTANT REMOVAL OF URBAN BMP DESIGNS

BMP/design	SUSPENDED SOLIDS	TOTAL PHOSPHORUS	TOTAL NITROGEN	OIL/GRASS DEMAND	TRACE METALS	BACTERIA	OVERALL REMOVAL CAPABILITY
<b>EXTENDED DETENTION POND</b>							
DESIGN 1	●	○	○	○	○	⊗	MODERATE
DESIGN 2	●	○	○	○	○	⊗	MODERATE
DESIGN 3	●	○	○	○	○	⊗	HIGH
<b>WET POND</b>							
DESIGN 4	○	○	○	○	○	⊗	MODERATE
DESIGN 5	○	○	○	○	○	⊗	MODERATE
DESIGN 6	●	○	○	○	○	⊗	HIGH
<b>INFILTRATION TRENCH</b>							
DESIGN 7	○	○	○	○	○	○	MODERATE
DESIGN 8	●	○	○	○	○	○	HIGH
DESIGN 9	●	○	○	○	○	○	HIGH
<b>INFILTRATION BASIN</b>							
DESIGN 7	○	○	○	○	○	○	MODERATE
DESIGN 8	●	○	○	○	○	○	HIGH
DESIGN 9	●	○	○	○	○	○	HIGH
<b>POROUS PAVEMENT</b>							
DESIGN 7	○	○	○	○	○	○	MODERATE
DESIGN 8	●	○	○	○	○	○	HIGH
DESIGN 9	●	○	○	○	○	○	HIGH
<b>WATER QUALITY INLET</b>							
DESIGN 10	○	⊗	⊗	⊗	⊗	⊗	LOW
<b>FILTER STRIP</b>							
DESIGN 11	○	○	○	○	○	⊗	LOW
DESIGN 12	●	○	○	○	○	⊗	MODERATE
<b>GRASSED SWALE</b>							
DESIGN 13	○	○	○	○	○	⊗	LOW
DESIGN 14	○	○	○	○	○	⊗	LOW

**KEY:**

- 0 TO 20% REMOVAL
- ◐ 20 TO 40% REMOVAL
- ◑ 40 TO 60% REMOVAL
- ◒ 60 TO 80% REMOVAL
- 80 TO 100% REMOVAL
- ⊗ INSUFFICIENT KNOWLEDGE

- Design 1: First-flush runoff volume detained for 6-12 hours.
- Design 2: Runoff volume produced by 1.0 inch, detained 24 hours.
- Design 3: As in Design 2, but with shallow marsh in bottom stage.
- Design 4: Permanent pool equal to 0.5 inch storage per impervious acre.
- Design 5: Permanent pool equal to 2.5 (Vr); where Vr=mean storm runoff.
- Design 6: Permanent pool equal to 4.0 (Vr); approx. 2 weeks retention.
- Design 7: Facility exfiltrates first-flush; 0.5 inch runoff/imper. acre.
- Design 8: Facility exfiltrates one inch runoff volume per imper. acre.
- Design 9: Facility exfiltrates all runoff, up to the 2 year design storm.
- Design 10: 400 cubic feet wet storage per impervious acre.
- Design 11: 20 foot wide turf strip.
- Design 12: 100 foot wide forested strip, with level spreader.
- Design 13: High slop swales, with no check dams.
- Design 14: Low gradient swales with check dams.

(Source MWCG, 1987)

## SCHEDULE D

### STORM INTENSITY GRAPHS FOR NORTH ELBA, NEW YORK

