MANUAL OF DESIGN, INSTALLATION, AND MAINTENANCE REQUIREMENTS

FOR

STORMWATER MANAGEMENT PLANS

May 2007
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SECTION 1  Responsibility of the Applicant

The applicant is responsible for providing sufficient information to determine compliance with the City of North Myrtle Beach (City) Stormwater Management Ordinance. The applicant is responsible for insuring that the information presented is true and factual representation of the existing conditions and proposed conditions after development. The applicant is also responsible for insuring that the improvements specified in the stormwater management plan will be constructed according to the approved plan.

The applicant shall prepare a Stormwater Pollution Prevention Plan (SWPPP) in accordance with the requirements herein and shall submit the plan to the City for review and approval. The City will forward approval to SCDHEC, Bureau of Water for NPDES coverage under SCR100000. The applicant shall not begin construction until permit coverage has been granted by SCDHEC.

A. Stormwater Management Plan Required Information

1. Application Form
   a. Name, Address and Phone Number of the Applicant and Owner if Different from Applicant.
   b. Name, Address and Phone Number of Professional Engineer.
   c. Legal Description of Property or Plat with Location Map.

2. Pre-development Site Information
   a. Location Sketch showing the proposed site, adjacent roads, existing drainage structures including pipes, ditches, streams, lakes, catch basins, and similar facilities. The location sketch shall be of sufficient scale to determine features of the proposed site.
   b. Existing topography shall be shown with no greater than 2-foot contours.
   c. Identification of existing soils characteristics on the site indicating seasonal water table conditions.
   d. Percolation Tests and Soil Boring by a professional soils testing company shall be provided if percolation or any other subsurface system are proposed. The percolation tests and soil boring shall be representative of the design conditions.
   e. The location sketch or plat shall show the location of the 100-year flood plain with known floodways if applicable
   f. Any off site facilities or property that might be impacted by the stormwater runoff from this project must be shown on the location sketch.

3. Stormwater Management Plan
a. The proposed improvements associated with the Stormwater Management Plan shall be shown on map(s) with a scale of no greater than 1” = 50’.
b. Identify and show water bodies and water courses adjacent to the site with details of size, side slopes, capacity and depth.
c. For any site with off site drainage flowing through the site, identify and show drainage basin boundaries for the site and any off site areas including direction of flow and acreage.
d. The location and details of all water control structures with control elevations and any seasonal water level regulation schedules.
e. Paving, grading, and drainage plans along with locations of roads, parking areas, and buildings along with their proposed elevations.
f. The location, size and elevation of any internal or external stormwater management facilities must be shown with sufficient details to determine the materials of construction and the manner of construction.
g. The location of any existing or proposed drainage easements must be shown. Easements shall be granted when stormwater facilities are to be maintained by the City. Easements must be obtained when stormwater management facilities are located on property not within the proposed site.
h. A separate sediment and erosion plan must be provided for the site identifying all structures and strategies proposed to control erosion and contain sediment. The plan must be in conformance with the Stormwater Management and Sediment Control Act.


a. Average slope and hydraulic length for both present conditions and for the future developed conditions.
b. The existing land use description (i.e. wooded-fair cover)
c. The amount of pervious and impervious surfaces for both the existing and developed conditions.
d. The drainage basin area in acres for both the site and any off site areas which drain onto or through the site.
e. Calculations of the peak rate of discharge for the required design storm and retention volumes for the first one inch of runoff.
f. Runoff routing calculations for detention basins showing discharges elevations, and volumes retained or detained during applicable storm events. Calculations of storm events or more frequent return periods to be performed to insure the effectiveness of the system in controlling lesser events.
g. For surface storage facilities, stage storage computation and stage discharge computations for major outfall structures must be based upon appropriate hydraulics.
h. The depth of ground water shall be from information provided by the Soils Conservation Service unless long term observations are available from a Professional Engineer of licensed soils testing laboratory.

i. For subsurface percolation system, the calculations shall be based upon the testing results obtained from a licensed soils testing laboratory with an appropriate factor of safety to account for seasonal variations in the groundwater table.

5. Legal and Institutional Information:
The person(s) or organization(s) responsible for operation and maintenance of the facilities included in the Stormwater Management Plan shall be clearly identified.

SECTION 2 STORMWATER MANAGEMENT PLAN PERFORMANCE STANDARDS

The purpose of this section is to establish engineering standards for the Design, Construction and Maintenance activities of Stormwater Management Plans. Stormwater Management Plans will be approved, consistent with procedures in the Stormwater Management Ordinance, when applicant has demonstrated that the proposed development activity has been designed and will be constructed and maintained to meet each of the following performance standards:

1. To encourage the use of “Best Management Practices”, i.e. maximum use of on site storage facilities to reduce runoff rates and volumes, and minimize erosion and sedimentation.

2. To design, construct and maintain stormwater management facilities in a manner which controls post-development runoff so as to simulate the time discharge function for pre-development runoff provided residual capacity is available in off site facilities to accommodate the runoff.

3. To design, construct and maintain stormwater management facilities in such a manner that erosion or sedimentation does not exceed natural of pre-development conditions.

4. To assure that no adverse impacts result from improper location, design and construction of stormwater management facilities.

5. To design construct and maintain stormwater management facilities consistent with mosquito objectives and programs.

6. To protect the water quality of the ocean and the physical characteristics of the beach area by minimizing the rates, volumes, and velocities of stormwater entering drainage systems discharging to the beach.
7. To design, construct, and maintain stormwater management facilities in compliance with all applicable state regulations, including 72-300, General Permit for Storm Water Discharges from SMS4’S SCR030000, SCDHEC/OCRM Stormwater Management Guidelines, and NPDES SCR035106

SECTION 3 STORMWATER MANAGEMENT PLAN DESIGN REQUIREMENTS

A. General

1. Plans, calculations, and supporting documentation as required by the Stormwater Management Ordinance for the design, construction and maintenance of stormwater management facilities shall be prepared and sealed by a Professional Engineer currently licensed in the state of South Carolina or a Professional Land Surveyor currently licensed by the state of South Carolina when permitted by the Ordinance.

2. Innovative approaches to stormwater management shall be encouraged and the concurrent control of flooding, erosion, sedimentation, and water pollution shall be mandatory.

3. Projects that are to be developed in phases will require the submission of a master plan of the entire project. Applications for individual projects may be considered only when the phases are totally independent of or make sufficient provisions for subsequent phases.

4. Development should maximize the amount of rainfall that infiltrates into the soils and minimize the amount of direct overland flow into public drainage facilities, adjoining streets, waterbodies, watercourses, and wetlands to the extent feasible. Channeling runoff directly into watercourses shall be prohibited; instead runoff shall be routed to reduce velocities, allow suspended solids to settle and remove pollutants.

5. A positive outfall for all runoff in excess of that retained shall be provided to a watercourse through appropriate easements or rights of way. If the downstream facilities are inadequate to convey the peak discharge for the design rainfall, the proposed development must accommodate that portion of runoff above actual capacity.

6. The soil types of a development and contiguous watershed area shall be of a prime consideration in the design and maintenance of all stormwater management facilities.

7. A Soil Erosion and Sediment Control Plan shall be prepared and submitted as a part of the Stormwater Management Plan.
B. Hydraulic Design Consideration

1. Design Storm
   Stormwater Management Systems shall be designed with sufficient hydraulic capacity for the 25-year frequency, 24-hour duration rainfall event.

2. Rainfall Data
   United States Weather Service Rainfall Data compiled for Horry County by the South Carolina Water Resources Commission shall be used in the hydraulic design. The current 25-year/24-hour design event is a 7.60-inch rainfall.

C. System Design Requirements

1. Method of runoff rate and Volume Computations

   The following methods and programs are acceptable for use in determining the Runoff Rate and Runoff Volumes. Any assumptions used in the computations must be clearly delineated. The computation results must be presented in a format that will permit confirmation of the results. For methods not outlined below, the applicant must provide sufficient detail to determine the accuracy of the method or program used.

   a. For sites with less than .5 acres, the Rational Hydrograph Procedure may be used.
   b. For all sites, the Soil Conservation Service TR-55 method may be used. This may be calculated by hand or using any computer program documented using the TR-55 method. A type II rainfall condition will be used.

2. Receiving Water Stage

   a. Regulated systems - Existing design and maintained elevations should be available from the City.
   b. Non regulated systems – The applicant must compute receiving water stages from the information available and submit the results to the City for review prior to utilizing such results for further computations.
   c. Any system – Tailwater stages should be considered if it has a significant influence on the design.

3. Detention / Retention

   a. As a minimum, adequate storage volume shall be provided to retain on-site the first inch of runoff generated by any storm event over the developed or redeveloped portion of the site. For certain soil conditions or groundwater table conditions, which do not permit percolation of this volume
over a five day period after the storm event, the City may approve detention with a filtration system in lieu of retention.

b. Outlet works shall be designed in accordance with accepted engineering principles, with particular attention to appropriate hydraulics including orifice, weir and culvert hydraulics.

c. Outlet structures shall be so designed to discharge an equal to or less than the pre-development runoff rate.

d. If the downstream drainage facilities are inadequate to convey the peak discharge for the design storm event, storage volume must be added to accommodate that portion of the runoff above the downstream’s actual carrying capacity and the outlet structure shall be sized to restrict the peak rates to accommodate downstream conditions.

e. Where a basin discharges into a stream, ditch swale or waterbody, an energy dissipator may be required by the City to reduce discharge velocities in order to minimize solid erosion and sediment transport.

f. For detention and retention basins, an emergency spillway may be required by the City to discharge flows in excess of 25 year, 24 hour storm event. The spillway shall be so located that the discharge does not erode the basin or receiving channel.

4. Subsurface Percolation Systems

a. Subsurface percolation systems shall be designed on the basis of actual or representative test data. Tests shall be consistent as to soil conditions, proposed pipe elevations, pipe locations and water table depths with the proposed subsurface percolation system.

b. Subsurface percolation systems shall be designed for the prevention of clogging by fine materials and for ease of cleaning with conventional sewer cleaning equipment. This may include but not necessarily be limited to wrapping of the perforated pipe and seepage trench with an appropriate fabric and providing sufficient clean outs on the system.

c. Systems shall have an overflow to a positive drainage system with a control device, if necessary, between the subsurface system and the positive drainage system. The overflow pipe shall be sized for the allowable discharge.

5. Impervious Areas

Runoff shall be discharged from impervious surfaces through retention basins, detention basins, filtering or cleansing devices and/or subject to some type of Best Management Practice prior to discharge from the project site. Best Management Practice shall mean a practice or combination of practices determined by the design professional to be the most effective means of preventing or reducing the amount of siltation and pollution generated by the project.
6. Stagnant Water Conditions

Dead end flow configurations, which create stagnant water shall not be allowed.

7. Stormwater Management Areas

Areas to be utilized for the conveyance or storage of stormwater shall be legally reserved for that purpose by plat, easement or other means so that subsequent owners or others may not remove such areas from their intended use. Such areas shall be connected to a public road or other location from which operation and maintenance is legally available.

8. Runoff

Runoff from higher adjacent or upstream lands shall be considered and provision for conveyance of such runoff shall be included in drainage plans.

D. Soil Erosion and Sediment Control Plan

1. Purpose

The purpose of the Soil Erosion and Sediment Control Plan is to provide effective measures to control erosion and sedimentation caused by the removal of ground surface cover.

2. General

a. Effective erosion and sediment and control design requires consideration of stormwater flow and soils to be encountered.

b. Proper design shall include measures for erosion control and provide for the establishment of vegetation that will help avoid erosion problems during and after development activities.

c. Alignment, grades, area of disturbs soil and bank slopes shall be based upon soil erodibility, climate exposure, geology, proposed vegetative restoration and expected maintenance.

3. Guidelines for Design

a. Slopes should be protected from erosion by quick establishment of vegetative cover, benches or terraces slope protection structures, mulches, or a combination of these practices as required.

b. Drainage channels should be designed to avoid erosion problems. Wide channels with flat slopes lined with grass or other vegetation should be used where practical. Where channel
gradients are steep, concrete linings or grade control structures such as check dams may be required. Every effort should be made to preserve natural channels.

c. Sediment basins may be constructed to trap sediment. The basins should be constructed with a positive outfall to discharge stormwater runoff while retaining sediment loads. Sediment basins may be temporary or permanent as required by the City.

d. Detention basins may also be used to trap sediment during and after development. Where used for this purpose, the basin shall continue to detain stormwater in accordance with the hydraulic design criteria, but storage volume for stormwater shall be required to account for the volume lost to sedimentation. Sediment must be removed periodically to insure the intended performance of the basin.

e. Good stands of existing vegetation adequate to control erosion shall be preserved wherever possible. Regeneration of trees and other large vegetation should be encouraged wherever possible.

f. Hay bales or silt fencing shall be placed around storm drainage inlets and at the boundaries of disturbed areas to trap sediment.

4. Contents of Soil Erosion and Sediment Control Plan

a. Location, scope, and manner of performing erosion control measures.

b. Proposed construction sequence and time schedule for all earth disturbing activities and installation of provisions erosion and sediment control and stormwater management.

c. Design computations and applicable assumptions for all structural measures for erosion and sediment control. Volume and velocity must be given for all surface water conveyance measure and piped outfalls.