SOUTH CAROLINA COASTAL COUNCIL

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I WATER
EMENT GUIDELINES

AUTHENTICATED
U.S. GOVERNMENT
INFORMATION
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REVISED SEPTEMBER 1, 1988

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I. INTRODUCTION

The South Carolina Coastal Council has directed the staff to utilize the "Storm Water Management Guidelines" in its review of projects requiring permit and certification decisions within the coastal zone. Therefore, applicants of projects requiring a permit or certification must submit storm water management plans which are in compliance with the requirements outlined in these guidelines. In many cases these guidelines present alternative approaches to addressing storm water management issues. If a local municipality or county has its own storm water ordinance, the Council may accept the project design that adheres to the stricter of the two requirements. In addition, the Coastal Council is receptive to new and innovative approaches which are adequately documented to meet the spirit of these guidelines.

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A. PURPOSE

The purpose of the "Storm Water Management Guidelines" is to protect, maintain, and enhance the public health, safety and general welfare by establishing minimum requirements and procedures to control the adverse impacts associated with storm water runoff. Proper management of storm water runoff will assist in the attainment and maintenance of water quality standards, reduce local flooding, and reduce the effects of development on land and stream channel erosion. It is the intention of these guidelines to spell out what drainage requirements must be met in the coastal zone in order to reduce or eliminate the damaging effects of storm water runoff. The coastal zone includes all of the following counties: Horry, Georgetown, Berkeley, Charleston, Dorchester, Colleton, Beaufort, and Jasper.

B. AUTHORITY

The "S. C. Coastal Council Storm Water Management Guidelines" are based upon the authority of the policies and regulations set forth in the S. C. Coastal Zone Management Program. Chapter III, Policy Sections I. (1)(d); III. D. (1)(c); IV. (1)(d); V. B. (1)(c); IX. C. (1)(c). These policies are intended to protect water quality by controlling nonpoint source pollution that is transported through drainage systems and ultimately deposited in coastal water bodies. Also, the "Permitting Rules and Regulations" of the S. C. Coastal Council require that "to the extent feasible the quantity and quality of any discharged waters shall not result in extensive alteration of wetlands or the quality of coastal waters."

C. ORGANIZATION

This document is organized in two major sections. The first section presents the different types of activities that a project may fall under and the corresponding requirements and restrictions that pertain to that particular class of projects. The major criteria that identify the types of storm water requirements necessary are based on location, lot coverage, and land use. At the end of this first section is a chart which gives an overview of the activities which require storm water management and which devices and controls are required for each activity.

The second major section presents basic design standards and requirements for storm water management systems. This section is divided into two subsections. The first subsection addresses requirements on retention and detention systems with their corresponding design criteria. The second subsection outlines different types of best management practices (BMP's) necessary in managing storm water and includes discussions on such topics as freshwater wetlands storm water management systems, sediment and erosion control practices, and maintenance requirements.

II. DEVELOPMENT DRAINAGE REQUIREMENTS

A. EXPLANATION OF CRITERIA

These guidelines are based upon three principles:

First, the location of a project will greatly determine the degree of its impact on the coastal environment. Those sites which are adjacent to receiving waters are much more likely to have an impact on water quality than those which are located farther inland. The natural processes of infiltration, absorption, evaporation, and the settling process, which occur during water transportation through natural drainage systems, will reduce or eliminate most of the materials usually found in storm water runoff.

Second, the amount of lot coverage or site alteration will have a direct relationship to the amount of storm water runoff and corresponding nonpoint source pollution created by a project. A low density subdivision, where most of the land is not covered by buildings or pavement, will generally have less of an impact on downstream water quality than will a shopping center with large amounts of rooftop drainage and extensive parking areas.

Third, land use is a significant determinant of the expected nonpoint source pollution generated by a site. Commercial areas generate greater volumes of oil, grease and heavy metals than residential areas because of the increased amounts of automobile traffic, more frequent use of parking facilities and greater accumulation of trash usually associated with commercial activities. Golf courses and carefully managed garden facilities are more likely to produce larger amounts of nitrogen-based fertilizers and other chemicals than backyards and small gardens because of the greater degree of maintenance activities occurring in these areas.

1. Location:

Three site location categories are used in implementing these guidelines.

a. Those project sites which are located directly adjacent to receiving water bodies. Receiving water bodies include all regularly tidally influenced salt and freshwater marsh areas, all lakes or ponds which are used primarily for public recreation or a public drinking water supply, and all other water bodies found within the coastal zone, excluding wetlands, swamps, ditches, and storm water management ponds which are not directly connected via an outfall or similar structure with a tidal water body.

b. Those project sites which are located within 1/2 mile of a receiving water body as described above.

c. Those project sites which are located beyond 1/2 mile of a receiving water body as described above.

Note: In determining the location category into which a site will fall, all piped drainage or impermeable ditches used for transporting storm water must be excluded (subtracted) from the measured distance to a water body as these devices do not provide any of the filtering and infiltration values found in natural transportation systems.

2. Lot Coverage

Five lot coverage categories (three residential and two commercial/industrial) are used in implementing these guidelines.

a. Residential Development

1) Low density - sites where buildings, roads, driveways and other impervious structures occupy not more than 35% of the total development area.

2) Moderate density - sites where buildings, roads, driveways and other impervious structures occupy more than 35% but less than 50% of the total development area.

3) High density - sites where buildings, roads, driveways, parking lots and other impervious structures occupy more than 50% of the total development area.

b. Commercial/Industrial Development

1) Low density - sites where buildings, roads, parking lots and other impervious structures occupy less than 50% of the total development area.

2) High density - sites where buildings, roads, parking lots and other impervious structures occupy more than 50% of the total development area.

3. Land Use

Three land use categories are used in implementing these guidelines.

a. Residential
b. Commercial/Industrial
c. Special Areas

1) Golf Courses
2) Beachfront Areas
3) Mines
4) Marinas and Boat Ramps

B. LOW DENSITY RESIDENTIAL DEVELOPMENTS (TYPICALLY SINGLE-FAMILY AND DUPLEX)

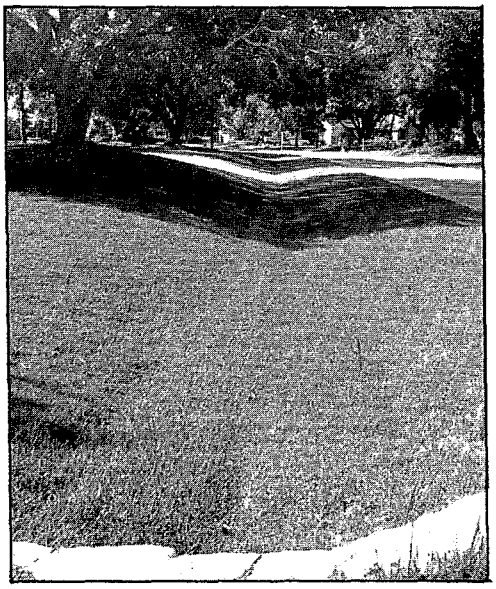

Figure 1. Low Density Residential

1. Adjacent to Receiving Water Body. Low Density Residential Developments, where buildings, roads, driveways and other impervious structures occupy no more than 35% of the development site, located directly adjacent to a receiving water body.

   a. The post-development rate of release into receiving water bodies must not exceed the pre-development rate, based upon a 5-year, 24-hour storm event.

   b. Sheet flow or swales or some other method addressed in the Best Management Practices should be used for the transportation of storm water. Note: See Section IV, pages 23 - 35 for information about Best Management Practices.

   c. Storm water runoff may be allowed to discharge into a wetland or water body if transported via a swale or other appropriate drainage method and released through an outfall structure of a design similar to those shown in the Best Management Practices. Note: See Section VI. C., pages 28 - 30 for design of storm water systems using wetlands.

   d. Those projects which are located directly adjacent to shellfish areas must permanently retain at least the first one and a half (1 1/2) inches of runoff on site and release this runoff only through evaporation and/or infiltration. Note: See Section III, pages 20 - 22 for Retention/Detention Requirements.

2. Within One-half Mile of Receiving Water Body. Low Density Residential Developments, where buildings, roads, driveways and other impervious structures occupy no more than 35% of the development site, located within 1/2 mile of a receiving water body.

   a. Runoff must be released at or below pre-development rates based upon a 5-year, 24-hour storm event.

b. Sheet flow and swales or some other method addressed in the Best Management Practices (See Section IV) should be used for the transportation of storm water.

c. Retention is not required.

3. Beyond One-half Mile of Receiving Water Body. Low Density Residential Developments, where buildings, roads, or driveways and other impervious structures occupy no more than 35% of development site, located beyond 1/2 mile of a receiving water body.

Best Management Practices are required.

C. MODERATE DENSITY RESIDENTIAL DEVELOPMENTS

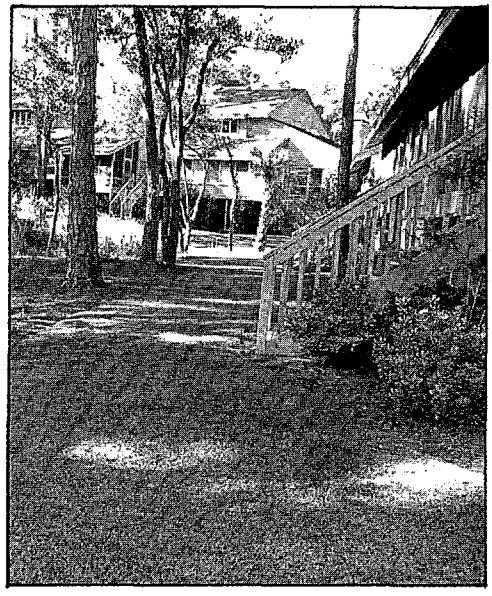

Figure 2. Moderate Density Residential

1. Adjacent to Receiving Water Body. Moderate Density Residential Developments, where buildings, roads, driveways and other impervious structures occupy more than 35% but less than 50% of the total development site, located directly adjacent to a receiving water body.

a. Parking lot and street drainage must be treated by one of the following methods.

1) All drainage to flow over at least 20 feet of grassed area or via a grassed swale into a detention system. Note: See Section III, pages 20 - 22 for Retention/Detention Guidelines.

2) All drainage to be routed into a retention system.

3) All drainage to flow through an oil and grease filtering catch basin into a detention system.

4) All drainage to be routed into an oil and grease filtering catch basin and then into an exfiltration system (Dutch drain or French drain).

b. All storm water coming off swimming pool decks or aprons or large paved or concrete surfaces not used for parking should be routed via sheet flow over at least 20 feet of grassed area or through an exfiltration, a retention, or a detention system prior to discharge from the site.

c. Runoff in excess of the retention/detention requirement (first inch) must be released at or below pre-development rates based upon a 5-year, 24-hour storm event.

d. Best Management Practices relating to roof drainage are optional.

e. Storm water runoff from lawns and landscaped areas may be allowed to discharge into a wetland or water body if transported via a grassed swale and released through an outfall structure of a design similar to those shown in the Best Management Practices. This provision is not applicable to sites located adjacent to shellfish grounds.

f. For those projects which are located directly adjacent to shellfish areas, the runoff from the first one and a half (1 1/2) inches of rain falling on the property must be permanently retained on site and released only through evaporation and/or infiltration. Note: See Section III, pages 20 - 22 for Retention/Detention Requirements.

2. Within One-half Mile of Receiving Water Body. Moderate Density Residential Developments, where buildings, roads, driveways and other impervious structures occupy more than 35% but less than 50% of the total development site located within 1/2 mile of a receiving water body.

a. Runoff must be released at or below pre-development rates based upon a 5-year, 24-hour storm event.

b. Sheet flow, swales or an alternative method identified in the Best Management Practices shall be used to transport storm water off site. Note: See Section IV, pages 23 - 35 for information about Best Management Practices.

c. Storm water from community parking facilities must be routed via sheet flow over at least 20 feet of grassed area or through exfiltration systems, swales or other grassed areas to allow infiltration to occur and to reduce the velocity of runoff.

3. Beyond One-half Mile of a Receiving Water Body. Moderate Density Residential Developments, where buildings, roads, driveways and other impervious structures occupy more than 35% but less than 50% of the total development site, located beyond 1/2 mile of a receiving water body.

Best Management Practices are required.

D. HIGH DENSITY RESIDENTIAL DEVELOPMENTS

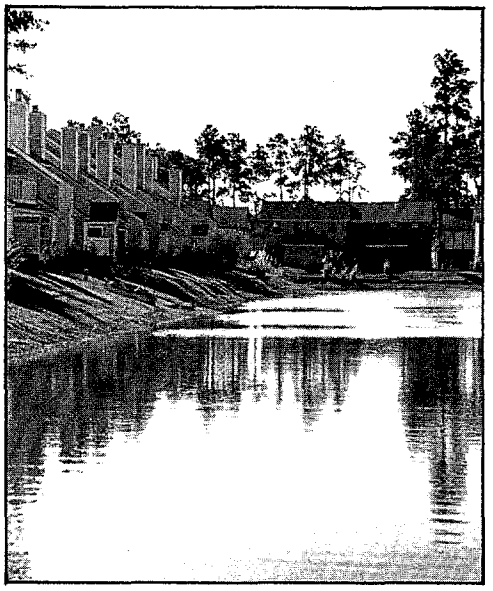

Figure 3. High Density Residential

1. Adjacent to Receiving Water Body. High Density Residential Developments, where buildings, roads, driveways and other impervious structures occupy more than 50% of the total development site, located directly adjacent to a receiving water body.

a. Sheet flow, swales and other methods identified in the Best Management Practices should be used when transporting water off site. Note: See Section IV, pages 23 - 35 for information about Best Management Practices.

b. Parking lot drainage must be treated by one of the following methods:

1) All drainage to flow over at least 20 feet of grassed area or via a grassed swale into a detention system. Note: See Section III, pages 20 - 22 for Retention/Detention Requirements.

2) All drainage routed into a retention system.

3) All drainage to flow through an oil and grease filtering catch basin into a detention system.

4) All drainage routed into an oil and grease filtering catch basin and then into an exfiltration system (Dutch drain or French drain).

c. All storm water from sidewalks, patios, and other impermeable areas, except for parking areas, should be routed via sheet flow over at least 20 feet of grassed area or through a retention or detention system before being discharged from the site.

d. Runoff in excess of the retention/detention requirement (first inch) should be released at or below pre-development rates based upon a 5-year, 24-hour storm event.

e. Roof top drainage must be addressed through Best Management Practices. Note: See Section IV, pages 23 - 35 for information about Best Management Practices.

f. Storm water runoff from lawns and other landscaped areas may be discharged directly into a receiving wetland or water body if transported via a swale and released through an outfall structure similar to those shown in the Best Management Practices. This provision does not apply to those sites located directly adjacent to shellfish areas. Note: See Section IV, pages 23 - 35 about Best Management Practices.

g. Those projects which are located directly adjacent to shellfish grounds must permanently retain the first one and a half (1 1/2) inches of runoff on site and release this runoff only through evaporation and/or infiltration. Note: See Section III, pages 20 - 22 for Retention/Detention Requirements.

h. Discharges into marsh areas or water bodies must utilize a discharge structure design similar to those shown in the Best Management Practices. Note: See Section IV, pages 23 - 35 for information about Best Management Practices.

2. Within One-half Mile of a Receiving Water Body. High Density Residential Developments, where buildings, roads, driveways and other impervious structures occupy more than 50% of the total development site, located within 1/2 mile of a receiving water body.

a. Parking lot drainage must be treated by one of the following methods:

1) All drainage to flow over at least 20 feet of grassed area or via a grassed swale into a detention system. Note: See Section III, pages 20 - 22 for Retention/Detention Requirements.

2) All drainage routed into a retention system.

3) All drainage to flow through an oil and grease filtering catch basin into a detention system.

4) All drainage routed into an oil and grease filtering catch basin and then into an exfiltration system (Dutch drain or French drain).

b. Runoff in excess of the retention/detention requirement (first inch) must be released at or below pre-development rates based upon a 5-year, 24-hour storm event.

c. Sheet flow, swales or other methods identified in the Best Management Practices will be used to transport water off site. Note: See Section IV, pages 23 - 35 for information about Best Management Practices.

d. Best Management Practices relating to roof top drainage are optional.

3. Beyond One-half Mile of Receiving Water Body. High Density Residential Developments, where buildings, roads, driveways and other structures occupy more than 50% of the total development site, located beyond 1/2 mile of a water body.

a. Parking lot runoff must utilize an appropriate Best Management Practice for handling of runoff prior to discharge off site. Note: See Section IV, pages 23 - 35 for information about Best Management Practices.

b. Best Management Practices are required.

E. LOW DENSITY COMMERCIAL-INDUSTRIAL DEVELOPMENTS

Figure 4. Low Density Commercial-Industrial

1. Adjacent to Receiving Water Body. Low density Commercial-Industrial Developments, where less than 50% of the total development site is covered by pavement, buildings or other impervious structures, located directly adjacent to a receiving water body.

a. All storm water coming from buildings or other structures must be routed via sheet flow over at least 20 feet of grassed area or through exfiltration or detention systems prior to discharge from the site.

b. Parking lot drainage should be treated by one of the following methods:

1) All drainage to flow over at least 20 feet of grassed area or via a grassed swale into a detention system. Note: See Section III, pages 20 - 22 for Retention/Detention Requirements.

2) All drainage routed into a retention system.

3) All drainage to flow through an oil and grease filtering catch basin into a detention system.

4) All drainage routed into an oil and grease filtering catch basin and then into an exfiltration system (Dutch drain or French drain).

c. Runoff in excess of the retention/detention requirement (first inch) must be released at pre-development rates based upon a 5-year, 24-hour storm event.

d. Best Management Practices pertaining to roof top drainage are optional.

e. Storm water runoff from landscaped areas may be discharged into a receiving wetland or water body if transported and released through an outfall structure similar to those in the Best Management Practices. This provision does not apply to those sites located directly adjacent to shellfish areas.

f. Those projects which are located directly adjacent to shellfish grounds must permanently retain the first one and a half (1 1/2) inches of runoff on site and release this runoff only through evaporation and/or infiltration. Note: See Section III, pages 20 - 22 for Retention/Detention Requirements.

2. Within One-half Mile of Receiving Water Body. Low Density Commercial-Industrial Developments, where less than 50% of the total development site is covered by pavement, buildings, or other impervious structures, located within 1/2 mile of a receiving water body.

a. Parking lot drainage must be treated by one of the following methods:

1) All drainage to flow over at least 20 feet of grassed area or via a grassed swale into a detention system. Note: See Section III, pages 20 - 22 for Retention/Detention Guidelines.

2) All drainage routed into a retention system.

3) All drainage to flow through an oil and grease filtering catch basin into a detention system.

4) All drainage routed into an oil and grease filtering catch basin and then into an exfiltration system (Dutch drain or French drain).

b. Runoff in excess of the retention/detention requirement (first inch) should be released at or below pre-development rates based upon a 5-year, 24-hour storm event.

c. Sheet flow, swales or other methods identified in the Best Management Practices should be used to transport water off site. Note: See Section IV, pages 23 - 35 for information about Best Management Practices.

3. Beyond One-half Mile of Receiving Water Body. Low Density Commercial-Industrial Developments, where less than 50% of the total development site is covered by pavement, buildings or other impervious structures, located beyond 1/2 mile of a receiving water body.

a. Best Management Practices are required.

b. Parking lot runoff must utilize an appropriate Best Management practice for runoff control prior to discharge off site. Note: See Section IV, pages 23 - 35 for information about Best Management Practices.

F. HIGH DENSITY COMMERCIAL-INDUSTRIAL DEVELOPMENTS

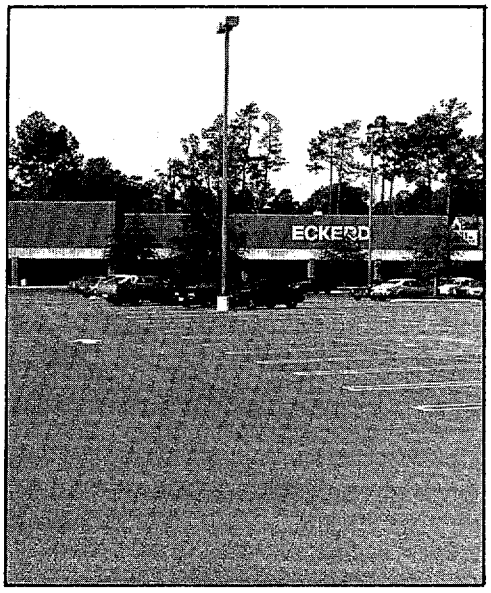

Figure 5. High Density Commercial-Industrial

1. Adjacent to Receiving Water Body. High Density Commercial-Industrial Developments, where more than 50% of the total development site is covered by pavement, buildings or other impervious structures, located directly adjacent to a receiving water body.

a. Parking lot drainage must be treated by one of the following methods:

1) All drainage to flow over at least 20 feet of grassed area or via a grassed swale into a detention system. Note: See Section III, pages 20 - 22 for Retention/Detention Requirements.

2) All drainage routed into a retention system.

3) All drainage to flow through an oil and grease filtering catch basin into a detention system.

4) All drainage routed into an oil and grease filtering catch basin and then into an exfiltration system (Dutch drain or French drain).

b. Runoff in excess of the retention/detention requirement (first inch) should be released at pre-development rates based upon a 5-year, 24-hour storm event.

c. All storm water from building areas and any paved surface must be routed through a retention or detention system. Note: See Section III, pages 20 - 22 for Retention/Detention Requirements.

d. Sheet flow, swales or other methods identified in the Best Management Practices will be used to transport water off site. Note: See Section IV, pages 23 - 35 for information about Best Management Practices.

e. Discharges into marsh areas or water bodies must utilize a discharge structure design similar to those shown in the Best Management Practices.

f. Those projects which are located directly adjacent to shellfish grounds must permanently retain the first one and a half (1 1/2) inches of runoff on site and release this runoff only through evaporation and/or infiltration. Note: See Section III, pages 20 - 22 for Retention/Detention Requirements.

2. Within One-half Mile of Receiving Water Body. High Density Commercial-Industrial Developments where more than 50% of the total development site is covered by pavement, buildings or other impervious structures, located within 1/2 mile of a receiving water body.

a. Parking lot drainage must be treated by one of the following methods:

1) All drainage to flow over at least 20 feet of grassed area or via a grassed swale into a detention system. Note: See Section III, pages 20 - 22 for Retention/Detention Requirements.

2) All drainage routed into a retention system.

3) All drainage to flow through an oil and grease filtering catch basin into a detention system.

4) All drainage routed into an oil and grease filtering catch basin and then into an exfiltration system (Dutch drain or French drain).

b. Runoff in excess of the retention/detention requirement (first inch) should be released at pre-development rates based upon a 5-year, 24-hour storm event.

c. All storm water from building areas and any paved surface must be routed over at least 20 feet of grassed area or through an exfiltration or retention or detention system.

d. Sheet flow, swales, and other methods identified in the Best Management Practices will be used for transporting water off site. Note: See Section IV, pages 23 - 35 for information about Best Management Practices.

3. Beyond One-half Mile of Receiving Water Body. High Density Commercial-Industrial Developments, where more than 50% of the total development site is covered by pavement, buildings or other impervious structures, located beyond 1/2 mile of a receiving water body.

a. Parking lot drainage must be treated by one of the following methods:

1) All drainage to flow over at least 20 feet of grassed area or via a grassed swale into a detention system. Note: See Section III, pages 20 - 22 for Retention/Detention Requirements.

2) All drainage routed into a retention system.

3) All drainage to flow through an oil and grease filtering catch basin into a detention system.

4) All drainage routed into an oil and grease filtering catch basin and then into an exfiltration system (Dutch drain or French drain).

b. Runoff should be released at or below pre-development rates based upon a 5-year, 24-hour storm event.

c. Best Management Practices are required.

G. SPECIAL CASES:

Figure 6. Golf Courses

1. Golf Courses

Golf courses located directly adjacent to or within 1/2 mile of a receiving water body.

a. Except where treated wastewater is used for irrigation, sheet flow and swales are the preferred methods of transporting water off site.

b. Areas designated to receive treated wastewater must be designed to prevent direct flow into adjacent marshes or water bodies. This may be accomplished by berms, drainage over very flat grassed areas, shallow temporary ponding locations, etc.

c. Greens, tees and other heavily fertilized areas must be designed so that runoff is directed away from marshes or water bodies.

d. Retention or detention systems must be incorporated into the design of drainage plans for these projects. Note: See Section III, pages 20 - 22 for Retention/Detention Requirements.

e. Public facilities around club houses will incorporate Best Management Practices. Note: See Section IV, pages 23 - 35 for information about Best Management Practices.

f. Parking lot drainage must be treated by one of the following methods:

1) All drainage to flow over at least 20 feet of grassed area or via a grassed swale into a detention system. Note: See Section III, pages 20 - 22 for Retention/Detention Requirements.

2) All drainage routed into a retention system.

3) All drainage to flow through an oil and grease filtering catch basin into a detention system.

4) All drainage routed into an oil and grease filtering catch basin and then into an exfiltration system (Dutch drain or French drain).

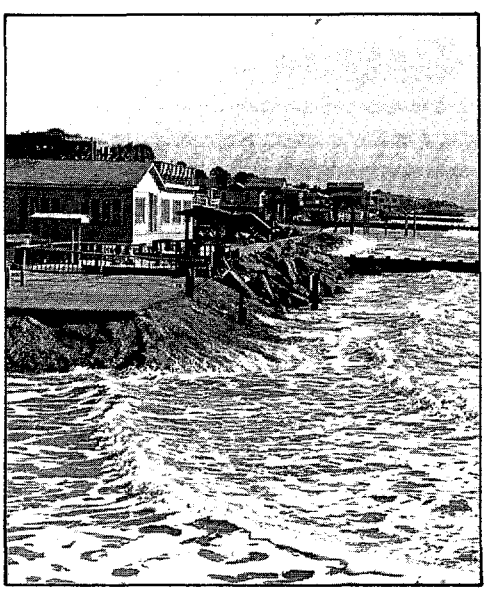

Figure 7. Beachfront Areas

2. Beachfront Areas:

In addition to the specific requirements given under each land use and location category, the following requirement is applicable to those projects which discharge directly to the Atlantic Ocean.

No direct discharge of storm water will be allowed onto the beachfront. One storm water overflow pipe per project will be allowed, provided that the drainage system is designed to retain and infiltrate the first four inches of storm water falling on the site. Overflow can only begin after this requirement has been satisfied. Detention systems should be designed to use the natural abilities of the soils as much as possible to infiltrate water back into the ground. All overflow pipes located in the critical area must receive a permit from the S. C. Coastal Council prior to installation.

3. Mines

The storm water restrictions that apply to other projects will also be required for mining operations. Because of the amount of sediment disturbance involved, it is imperative that mining projects control their storm water runoff. These operations must meet the retention requirements set forth in Section III, B. A retention basin of adequate volume will be constructed and frequently maintained to clean out sediment, etc. Other sediment and erosion control devices may be necessary for the duration of the project. Best Management Practices to prevent sedimentation and/or dewatering of adjacent wetlands must be incorporated.

4. Marinas and Community Boat Ramps

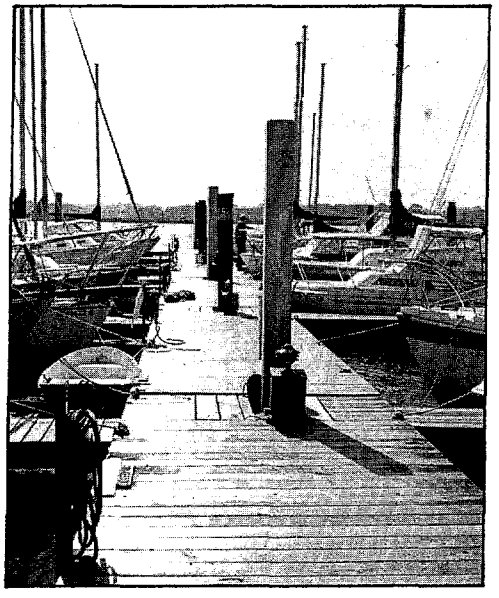

Figure 8. Marina

a. Public facilities must incorporate best management practices in their design.

b. Parking lot drainage must be treated by one of the following methods:

1) All drainage to flow over at least 20 feet of grassed area or via a grassed swale into a detention system. Note: See Section III, pages 20 - 22 for Retention/Detention Requirements.

2) All drainage to be routed into a retention system.

3) All drainage to flow through an oil and grease filtering catch basin into a detention system.

4) All drainage to be routed into an oil and grease filtering catch basin and then into an exfiltration system (Dutch drain or French drain).

c. Fueling and boat wash-down areas must be designed to address the impacts of runoff from oils, greases and detergents. Accordingly, oil and grease and detergent runoff must be treated in a manner that prevents them from reaching the critical areas. Oil and grease filtering catch basins, retention areas and exfiltration systems are the recommended methods for addressing these impacts.

d. Boat maintenance areas must be located on highland. Drainage from these areas must be handled either through an exfiltration system or retention system. A plan for clean out and maintenance of these systems will be required with each submittal.

e. Boat ramps should be designed to include provisions for protecting the critical area from upstream runoff and discharges from boats being launched and retrieved. Grates covering the full width of the ramp leading to drywells or exfiltration systems will be required for all community ramps.

f. Facilities directly adjacent to shellfish areas must store the first one and a half (1 1/2) inches of water falling on the property.

RESIDENTIAL DRAINAGE GUIDELINES - S. C. COASTAL COUNCIL

Type of Activity	Rate of Release Should Not Exceed Pre-Development Rate	Retention Guidelines	Shellfish Grounds Discharge Restrictions	Rooftop	Best Management Practices Required	Swales or Similar Transportation Systems	Special Discharge Structures	Parking Lot Drainage	Wetlands Should Be Incorporated Into Drainage System Design	Sediment and Erosion Control Practices Required	Maintenance Plan Required
LOW DENSITY RESIDENTIAL AREAS											
Located adjacent to a water body	X		X			X	X		X	X	X
Located within 1/2 mile of a water body	X					X			X	X	X
Located beyond 1/2 mile of a water body					X				X		
MODERATE DENSITY RESIDENTIAL AREAS											
Located adjacent to a water body	X	X	X	X		X	X	X	X	X	X
Located within 1/2 mile of a water body	X					X		X	X	X	X
Located beyond 1/2 mile of a water body					X				X		
HIGH DENSITY RESIDENTIAL AREAS											
Located adjacent to a water body	X	X	X	X		X	X	X	X	X	X
Located within 1/2 mile of a water body	X			X		X	X	X	X	X	X
Located beyond 1/2 mile of a water body					X			X	X	X	X

COMMERCIAL DRAINAGE GUIDELINES - S. C. COASTAL COUNCIL

Type of Activity	Rate of Release Should Not Exceed Pre-Development Rate	Retention Guidelines	Shellfish Grounds Discharge Restrictions	Rooftop	Best Management Practices Required	Swales or Similar Transportation Systems	Special Discharge Structures	Parking Lot Drainage	Wetlands Should Be Incorporated Into Drainage System Design	Sediment and Erosion Control Practices Required	Maintenance Plan Required
COMMERCIAL-INDUSTRIAL DEVELOPMENTS WHERE LESS THAN 50% OF LOT AREA IS COVERED											
Located adjacent to a water body	X	X	X	X		X	X	X	X	X	X
Located within 1/2 mile of a water body	X					X		X	X	X	X
Located beyond 1/2 mile of a water body					X			X	X	X	X
COMMERCIAL-INDUSTRIAL DEVELOPMENTS WITH GREATER THAN 50% LOT COVERAGE											
Located adjacent to a water body	X	X	X	X		X	X	X	X	X	X
Located within 1/2 mile of a water body	X	X		X		X		X	X	X	X
Located beyond 1/2 mile of a water body	X				X			X	X	X	X
SPECIAL CASES											
Golf Courses located adjacent to or within 1/2 mile of a a water body		X			X	X	X	X	X	X	X
Beachfront Areas		X					X			X	X
Mines		X			X					X	X
Marinas and Boat Ramps			X				X	X		X	X

III. RETENTION AND DETENTION

Retention is the permanent storage of storm water runoff without discharge to downstream areas. Because of the limitation on discharge, the capacity of retention areas to store storm water is totally dependent upon lagoon size and the natural processes of evaporation and infiltration.

Detention is the onsite storage of storm water over varying time periods, designed for eventual release to downstream areas. The operational characteristics of a detention system are dependent upon the size of the drainage basin, the capacity of the detention pond, the diameter or size of the discharge and the characteristics of the soil.

A. BENEFITS OF RETENTION AND DETENTION

Both retention and detention facilities are beneficial to urban flood control programs, as well as pollution control, in that a properly designed and maintained system can produce the following benefits by controlling storm water onsite:

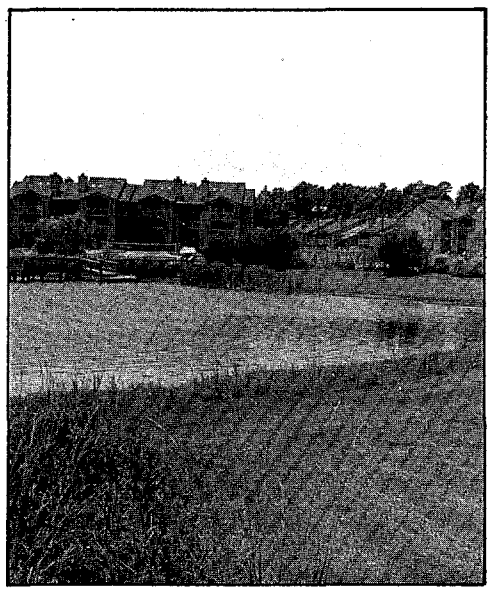

Figure 9. Typical Retention Pond

1. The infiltration and evaporation processes can reduce the volume of runoff which would eventually be discharged.

2. A detention system can provide a time-delayed release of runoff water reducing the chance of flooding to downstream areas.

3. Both systems will remove pollutants and other materials by reducing velocities and thus allowing these substances to settle.

4. Both retention and detention systems can provide limited recharge of groundwater aquifers.

5. Both systems can control erosion by reducing discharge velocities.

6. Both systems reduce the required size of downstream storm water control facilities (i.e., pipes, culverts, discharge points, channels, etc.).

7. If properly designed, both systems can be attractive amenities to commercial and residential projects.

B. REQUIREMENTS OF RETENTION AND DETENTION

Both retention and detention facilities built within the coastal zone must meet the following requirements:

1. Where the use of retention or detention facilities is indicated, the facilities must be designed to retain or detain runoff from the first inch of rain falling on the built-upon portion of the property.

2. Runoff in excess of the first inch must be released at or below pre-development rates using a 5-year, 24-hour storm for design purposes.

3. Retention lagoons designed to retain a permanent water elevation for aesthetic purposes must be designed to provide required capacity above their permanent design water elevation.

4. Retention is mandatory for projects located directly adjacent to shellfish areas. In these areas, runoff from the first one and a half (1 1/2) inches of rain falling on the property must be permanently retained on site and released only through evaporation and/or infiltration. For this requirement, the phrase "directly adjacent to" includes any project in which the shellfish area is within 1000 feet of any point on the outer perimeter of the project.

5. Outfall structures must be designed to reduce velocity and disperse runoff at the discharge locations. Outfall structures that encourage channelization and erosion will not be approved. Outfall structures will not be extended into marsh areas unless such placement is unavoidable; a Coastal Council permit will be required in those instances.

6. In the design of a retention or detention system, the outlet structure(s) should be located strategically as far away from the inlet as feasible to prevent short-circuiting of the pond. Figure 10 shows situations in which the outlet is incorrectly located, causing short-circuiting resulting in areas of dead storage.

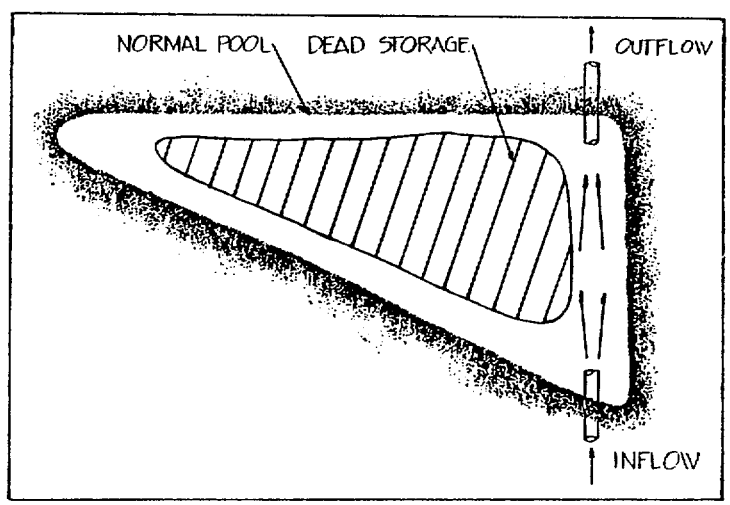

Figure 10. Short-Circuiting of a Pond

7. Both retention and detention basins must contain side slopes that are no steeper than 3:1 (horizontal:vertical). For permanently wet retention ponds, this 3:1 limitation must be maintained out to a depth of at least one foot below the control water elevation. From that point to the floor of the basin the minimum slope requirement is reduced to at least 2:1.

8. All side slopes shall be stabilized with vegetation prior to final approval in order to minimize erosion and subsequent sedimentation of the basin.

9. The minimum depth of a permanently wet retention system from normal water elevation to the floor of the pond is 4 feet.

10. Detention and retention basins must sufficiently drain down to provide the capacity for handling the design volume of storm water within 72 hours following a storm event.

11. An overflow structure able to handle a greater than design storm event must be designed into the discharge outlet system. All spillways should be either stabilized rip-rap using filter cloth or concrete.

12. Each inlet and outlet point for a pond must be rip-rapped on filter cloth to prevent erosion.

13. All ponds must be designed to make future maintenance possible. (See page 35 , Maintenance).

14. Mechanical aeration devices will be permitted in retention or detention systems.

15. Detention systems which store water temporarily and then become completely dry must maintain an effective grass covering. These areas will not be approved where excessive sedimentation or erosion is likely to result.

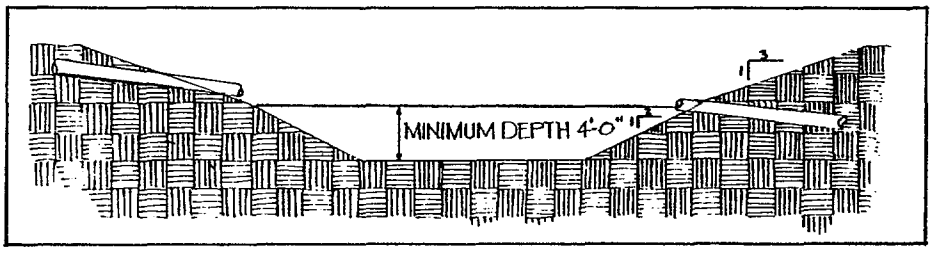

Figure 11. Typical Pond Cross Section

IV. BEST MANAGEMENT PRACTICES

Within certain sections of the coastal zone the following management practices are necessary to achieve proper management of storm water discharges and are hereinafter referred to as "Best Management Practices." These Best Management Practices pertain to construction procedures, methods of transporting or handling specific types of runoff, paving materials, roof drainage and other aspects of storm water management. Certain types of Best Management Practices are indicated as being necessary for some types of development. The list is not exhaustive; other Best Management Practices may be used if their effectiveness is properly documented.

The following practices should be used in the coastal zone for the management of storm water:

A. METHODS OF TRANSPORTING STORM WATER OFFSITE

Any one or any combination of these methods, as approved, may be used to meet site drainage requirements as detailed in Section II of this document.

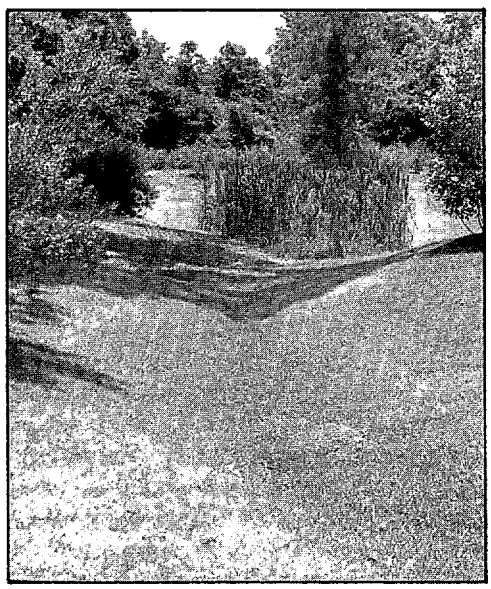

Figure 12. Typical Grassed Swale

1. Swales: Grassed swales graded at a minimum of 4:1 side slopes are the preferred method of transporting storm water instead of piped drainage or ditches. Swales with a heavy grassed covering are very effective in reducing runoff velocities and providing opportunities for infiltration and vegetative filtering prior to release.

When designing these systems, a velocity-reducing or dissipation structure should be placed at the termination of the grassed swales to reduce the possibility of erosion. Whenever swales are used as detention systems, these swales should be equipped with an underdrain if feasible (this allows for greater infiltration and reduces the possibility of stagnant water remaining within the swale). Grassed swales should be sized and constructed such that the maximum velocity within the swale does not exceed 6 feet per second. Final approval on any swale will not be given until the vegetative grass cover is fully established. If properly designed, swales can be used for passive recreational activities during dry weather.

2. Sheet Flow: In low density areas, sheet flow runoff over grassed lawns is a preferred method of transporting storm water. This type of practice usually requires only grading and seeding during construction. Maintenance is not expensive. Sheet flow allows the benefits of infiltration and vegetative filtering to be achieved prior to releasing runoff.

3. Rock Lined Ditches: These ditches consist of a conventionally constructed ditch with a layer of loose gravel-type rock material lining the bottom. Usually this layer is from 6" to 2 feet in depth. Filter fabric or some other material should be used between the gravel and soil to prevent clogging. These ditches should be sized such that the rock lining is stable against velocity attack for the design flow conditions. Benefits of rock lined ditches include increased infiltration and a reduction in the velocity of the runoff.

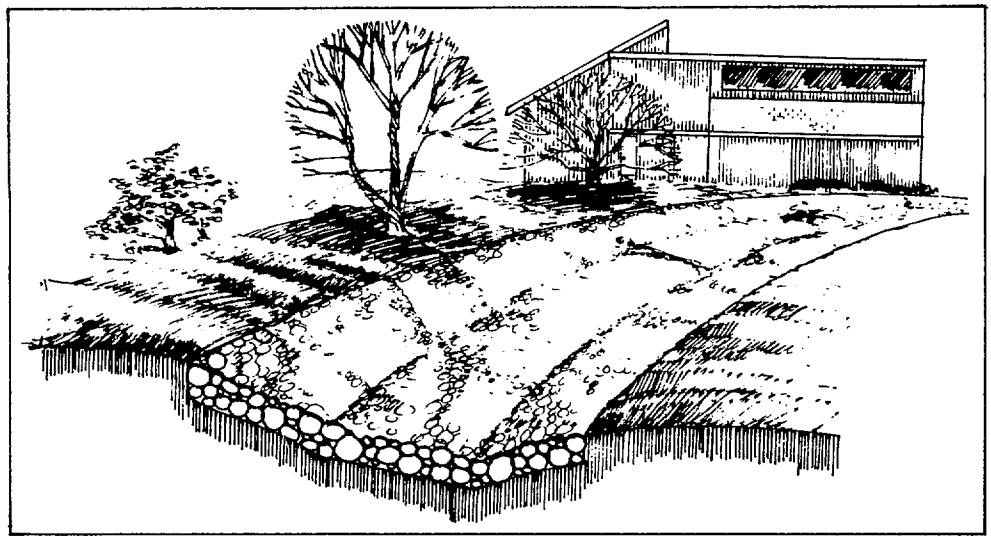

Figure 13. Rock Lined Ditch

4. Exfiltration Trench/Pipe Systems: The two types of exfiltration systems most often used are Dutch drains and French drains. Some comments and requirements about exfiltration systems in general will be provided as well as specific comments on Dutch and French drains.

Soil conditions dictate whether or not exfiltration systems are applicable. Exfiltration systems must be constructed in permeable soil with six to ten inches of clearance between the trench bottom and the seasonal high water table. Therefore a comprehensive soil analysis will be required.

In the design of exfiltration systems, all debris and matter that would normally clog the voids in the trench and/or pipe should be eliminated prior to reaching the exfiltration system. Baffled catch basins should be used in conjunction with other Best Management Practices to reduce the sand and other debris entering

the exfiltration system. These catch basins should be designed with an overflow pipe capable of handling at least a twenty-five year storm event. Cleanouts must be located at least every 150 feet in an exfiltration trench/pipe system.

These exfiltration systems may not be allowed to receive runoff until the entire contributary drainage area to the system has received final stabilization.

a. Dutch Drains: A Dutch drain is a narrow trench filled with rock or gravel sized to provide 20-40 percent voids, encased with filter fabric and used to absorb or store runoff until it can percolate into the ground.

b. French Drains: French drains consist of a perforated drain pipe laid in a pervious material usually surrounded by gravel and wrapped in filter cloth.

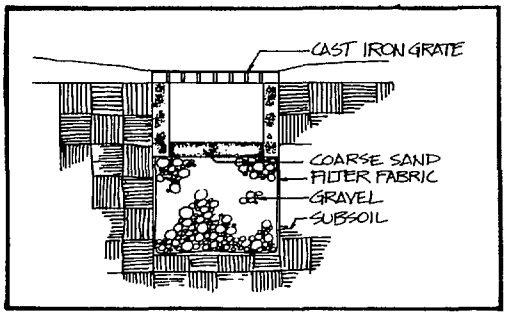

Figure 14. Dutch Drain

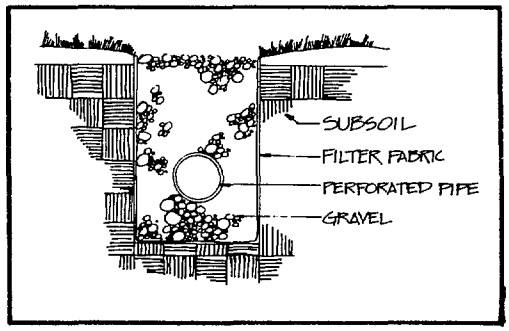

Figure 15. French Drain

B. COLLECTION/DISTRIBUTION METHODS

Any one or any combination of these methods, as approved, may be used to meet site drainage requirements as detailed in Section II of this document.

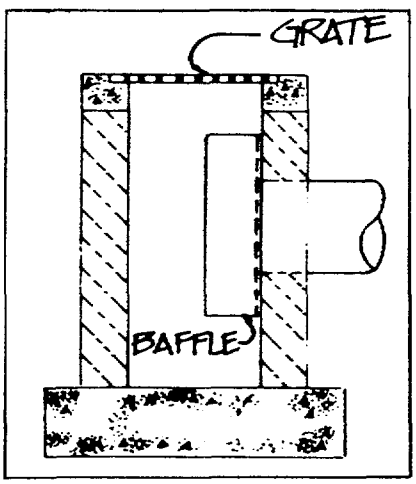

Figure 16. Oil/Grease Filtering Basin

1. Oil and Grease Filtering Catch Basins: These structures are designed to collect and distribute runoff coming from parking areas. Residues of oil and grease are commonly found in storm water coming from these areas. A sheet metal baffle, or similar design, is used to prevent floating oil films from entering into the basin's outlet pipe. The outlet pipe is raised above the bottom of the catch basin for the purpose of allowing grease and other settleable materials to fall and collect in the bottom of the basin. One variation of this design utilizes an impervious floor of concrete. A second design uses a

bottom consisting of a layer of rock material lined by filtering fabric to encourage infiltration. Because of the collection of solid material on the bottom of the basin, periodic maintenance is required.

2. Raised Catch Basins: Another technique for collecting and distributing storm water is to design the discharge system to include the use of raised catch basins. These catch basins are constructed so that the top lip of the catch basin is raised 1 to 2 inches above the surrounding swale or surface elevation. This requires water to first pond on that surface and be raised above the catch basin before it enters into the drainage system. The ponded water in the swale would then infiltrate into the ground or be evaporated. These catch basins should only be used in grassed areas where rapid infiltration is expected and not on any paved surfaces.

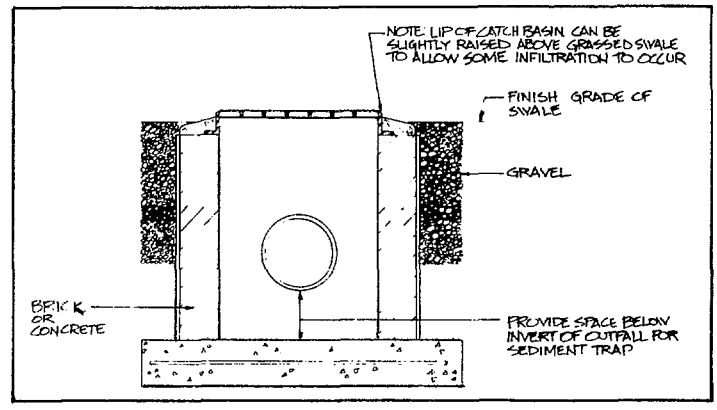

Figure 17. Raised Catch Basin

3. Dual Compartment Catch Basins: These systems are similar to other catch basin designs except that they contain multi-compartments. As seen in Figure 17 these basins are larger than normal ones and have a separator placed in the middle of the two sections. The runoff enters the back section where it builds up, as sediment settles out, until it finally overtops the separator and flows into the second compartment. The runoff then exits after passing through an oil/grease separator outlet pipe. These basins, as do the others, require regular maintenance to pump out the settled out sediments and residues of oil and grease.

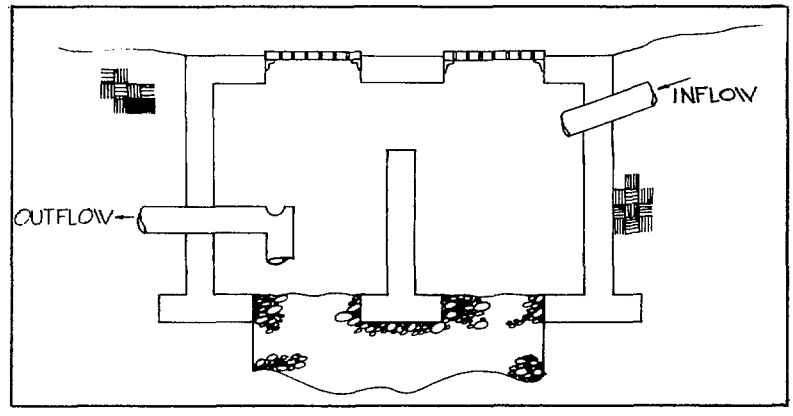

Figure 18. Dual Compartment Catch Basin

4. Dry Wells - Seepage Pits: These structures are cavities dug into the ground and filled with gravel or rocks. A filter fabric wrapping is used to prevent system clogging and to retain the ability to infiltrate runoff. These structures are useful in serving as the terminal point for roof drains, piped systems draining small parking lots, and similar uses.

5. Parking Lot Planting Areas: Many parking area requirements found in local regulations specify that a certain percentage of the lot must be set aside for planting or shrubbery. Frequently these planting areas are designed as islands and used to separate different aisles of parking. An effective means of reducing the amount of runoff and the velocity of the discharge coming from a parking area is to route runoff into these planting areas. By designing these planting strips in the form of a shallow bowl these areas can be used as detention areas connected in series to each other or as individual retention basins. Routing storm water into these areas also produces a secondary benefit of reducing the amount of water needed to irrigate plants. Trash and other debris will be periodically washed into these basins, but minor maintenance will allow these areas to perform a valuable function.

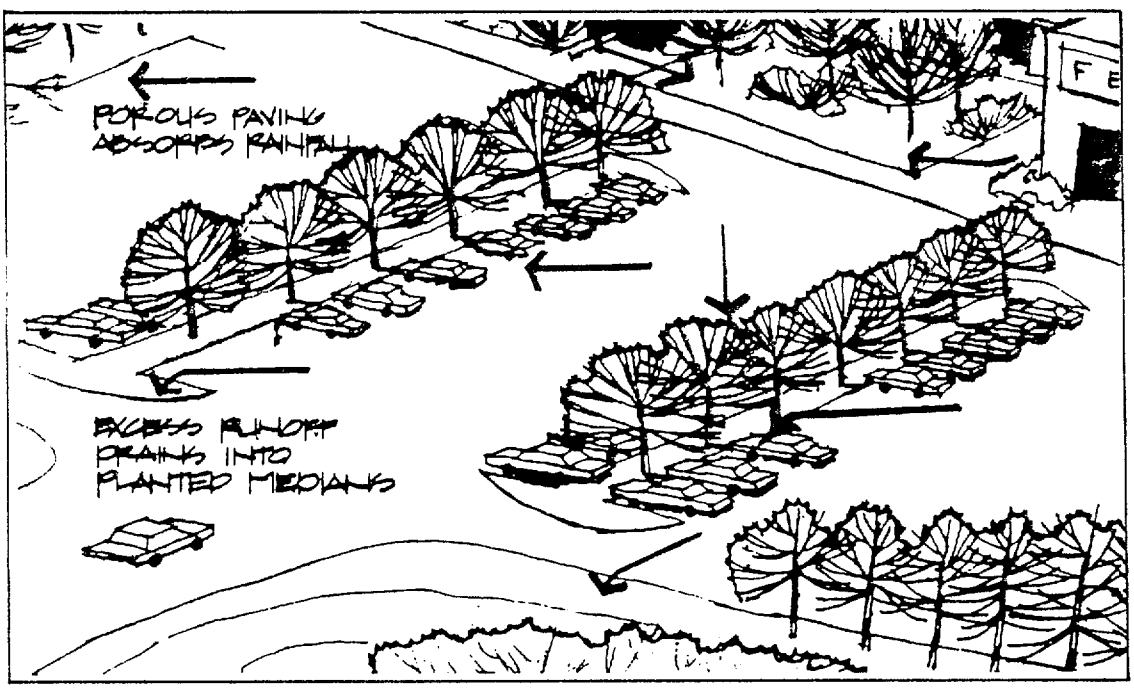

Figure 19. Parking Lot Planting Areas

6. Building Setback: Buildings and other structures associated with development projects should be set back from marsh or waterfront locations. A setback of at least 25 feet will provide storm water runoff, transported via the sheet flow method over a grassed area, with an opportunity to be filtered or absorbed prior to its entry into the critical area.

7. Discharge Structures: Marsh Outfalls Drainage projects will be designed so that the final elevation of a storm water discharge outlet is at or above the edge of the Coastal Council's critical area (wetland boundary). These structures will also be designed to reduce velocities of the discharged water to discharge a sheet flow into the receiving marsh. Structures which will result in excessive erosion or channelization of marsh areas will not be approved.

C. FRESHWATER WETLANDS STORM WATER SYSTEMS

Many projects within the coastal zone will be located within or adjacent to freshwater wetlands. These wetlands are natural filters and can often be utilized as receiving areas for storm water runoff. Therefore, these wetland systems when combined with other storm water best management practices can frequently be incorporated into the overall drainage plan. The Council does not support the conversion of natural wetlands into lagoon or lake systems, but will approve the use of these areas in their natural state as part of the storm water management system.

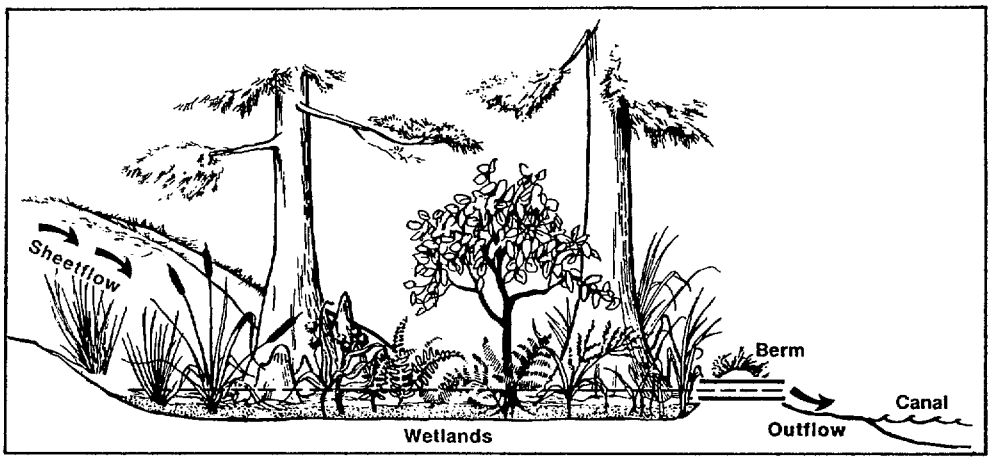

Figure 20. Wetlands Detention System

When using freshwater wetlands in the storm water management system, a well-planned effort is required to avoid any potential damage to the natural resource. The system should include a variety of individual best management practices that work together to achieve the desired results. For example, a pre-treatment lake located in high ground adjacent to a wetland can reduce sediment loads, remove oils and greases and attenuate storm water volumes. Also, grassed swales could be used to collect and convey storm water to a distribution system (spreader swale, overflow berm, rip-rap discharge structure, etc.) to ensure

sheetflow of storm water through the wetland. This provides for greater contact of the storm water with the vegetation of the wetland and ensures a longer residence time within the wetland. All projects using wetlands in their storm water design must incorporate an extensive sediment and erosion control plan during construction. The entire wetland area needs to be protected against any potential sediment intrusion. Also, all projects of this type should include a mechanism to minimize the amounts of oils and greases entering the wetlands.

1. When freshwater wetlands are involved in a project site the following order of design priorities will be used for storm water systems:

   a. Avoid the wetlands; use highground alternatives (i.e., ponds, swales, etc.).

   b. Use wetlands in their natural state.

      1) For low density residential, sheetflow storm water over grassed area into wetlands using other best management practices as appropriate.

      2) For all other development, the wetlands will be used in combination with other Best Management Practices to meet the general storm water management guidelines.

      3) Manage water levels to maintain the hydrology of the natural wetland.

   c. Excavate storage requirements out of immediately adjacent highground and overflow into the wetland area for additional treatment.

   d. In special cases where the above alternatives are impractical, the Council staff will coordinate with the applicant to identify alternatives.

2. Where natural wetland values are lost due to digging adjacent to or in freshwater wetlands, a combination of the following design criteria will apply to help replace some of the lost values:

   a. Construct submerged 10:1 shelves, 10 - 15 feet wide, around a portion or portions of the storm water pond for emergent vegetation (slope and width can vary to meet the particular situation). Consult with Council staff biologist for depth of shelf.

   b. Leave islands or peninsulas of natural wetland vegetation.

   c. Leave upland buffer of natural vegetation around a portion or portions of the storm water pond for a transitional zone. The buffer width can vary to meet the particular situation.

d. Design the water level management system to maintain wetland values.

e. Consider the need for revegetation of created or disturbed wetlands.

D. ROOF DRAINAGE

1. Roof drainage from large buildings should be collected in gutter systems and routed into dry wells, infiltration pits, French drains or similar structures. These collection facilities can be used to infiltrate roof drainage back into the ground to prevent any pollutants carried by the runoff from being deposited in receiving waters.

2. Roof drainage from smaller buildings is generally not a problem. This type of drainage should either be allowed to sheet flow off the roof and be absorbed by lawns and other grassed areas or collected in a gutter system and discharged over splash blocks as sheet flow over the lawn.

3. Many flat roofs can be used to store one to three inches of water for a retention device. Detention rings can be used on roof drains for temporary storm water storage.

E. GOLF COURSE DRAINAGE

Design Consideration: Storm water runoff from golf courses and other large open space areas shall be routed via swales and land contours into lagoon systems prior to release. Greens and tees which are built directly adjacent to marsh areas must be designed to carry runoff away from marsh lands because of heavy fertilization of these areas. These and any other areas not draining directly into a pond or lake will be bermed in order to eliminate direct discharges into environmentally sensitive areas.

Golf courses that are used for treated effluent spray irrigation will be required to include more restrictive designs for handling storm water runoff.

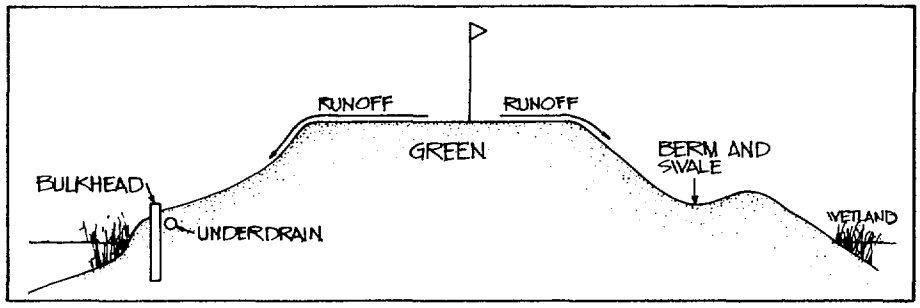

Figure 21. Controlling Golf Course Runoff

F. PAVING MATERIALS

Any one or any combination of these methods, as approved, may be used to meet site drainage requirements as detailed in Section V of this document.

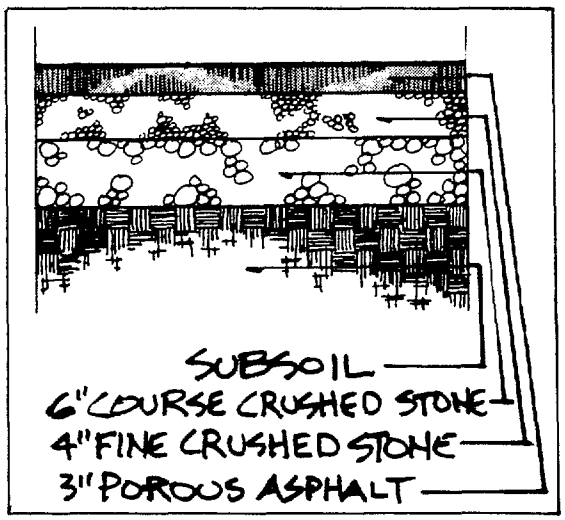

Figure 22. Permeable Paving

1. Permeable Asphalt Paving: Permeable asphalt is a relatively new type of paving material which allows water to pass through the surface and is infiltrated into the subsurface soils. Its suitability for use is highly dependent upon the ability of the underlying soil base to percolate water and the construction practices used to install the paving surface. Generally, these paving surfaces consist of a 3-inch layer of porous asphalt, a 3 to 4-inch fine crushed stone base and a 6 to 12-inch course of larger sized crushed stone. Compaction is generally kept to a minimum when installing porous paving surfaces. This surface appears particularly suitable for light weight, light use areas such as parking spaces.

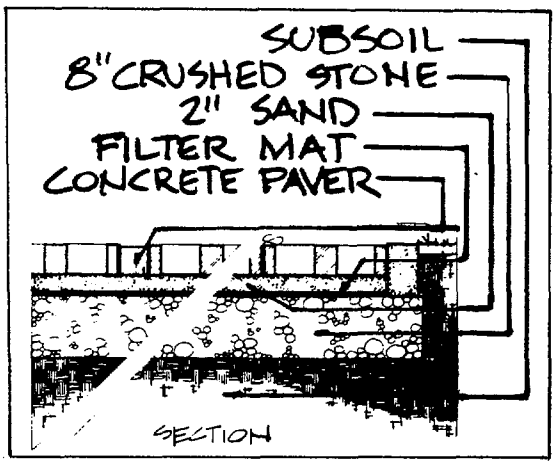

Figure 23. Lattice Block Paving

2. Paving Blocks: Several different types of paving blocks are available which can be used to support automobile traffic and still leave enough unpaved area to allow infiltration to occur. These paving blocks are usually hand placed over approximately two inches of sand which overlays a crushed stone base of six to eight inches in depth. Cost of installing these types of blocks is usually higher than for other types of paving surfaces; however, maintenance costs are probably less than for other surfaces. These blocks are attractive and have benefits where aesthetic considerations are important.

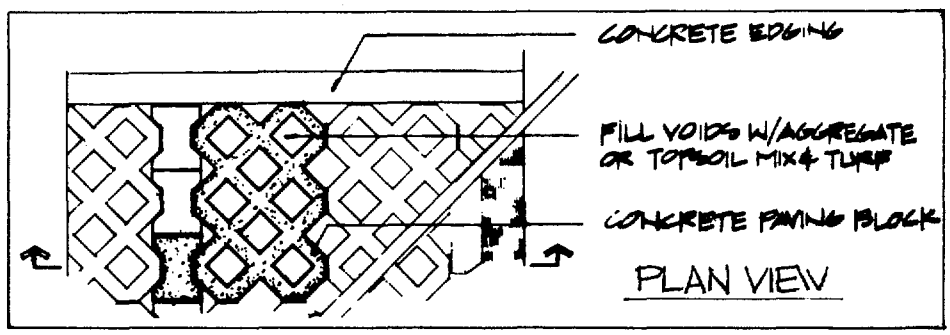

Figure 24. Paving Block (Plan View)

3. Other Pavement Surfaces: Coquina, gravel, oyster shell and similar surfaces are suitable for use in lightly traveled areas. While these surfaces will not be suitable for use in areas which will carry heavy volumes of traffic, they can be well suited to limited areas. Use of these surfaces will reduce the amount of built-upon area and allow more infiltration to occur.

G. GUIDELINES FOR MOSQUITO CONTROL

There are several practices which can be incorporated into the design, construction, and maintenance phases of storm water management systems in order to reduce mosquito problems. Some of these management practices for mosquito abatement are:

1. The bottom of retention and detention ponds should be graded and have a slope not less than 0.5 percent.

2. There should be no depressions in a detention facility where water might pocket when the water level is receding.

3. Detention systems and swales should be designed to drain dry within three (3) days.

4. An aquatic weed control program should be utilized in retention facilities to prevent an overgrowth of vegetation in the pond.

5. Fish should be stocked in permanently wet retention ponds.

6. Swales and detention pond bottoms should be mowed without the creation of tire ruts.

H. SEDIMENT AND EROSION CONTROL PRACTICES

New construction is a primary source of sedimentation. To decrease problems associated with sedimentation, a sediment and erosion control plan must be developed prior to project approval. Several practices which may satisfy the sediment and erosion control requirements can be incorporated to stop or limit sedimentation from occurring during construction. Any one or any combination of these methods, as approved, may be used to meet site drainage requirements as stated in Section II of this document.

1. Silt fences, hay bales or other approved erosion control measures shall be properly installed around storm sewer inlets and at the boundaries of disturbed areas to trap sediment on-site.*

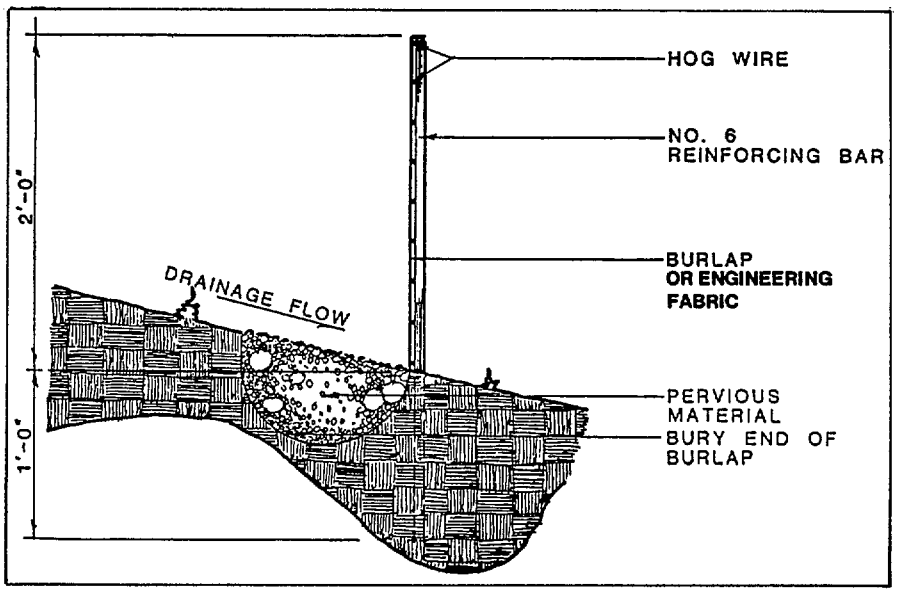

Figure 25. Typical Silt Fence Design

2. Temporary check dams on drainage swales, ditches, and waterways can be installed to slow stream flow and allow sediment to be deposited. These dams can consist of sand bags, rip-rap, hay bales, burlap screens or similar materials. At the completion of construction the material deposited behind the dam is cleaned up and the dam removed.

3. Temporary vegetation or a straw cover may be used in exposed soil areas. Exposed areas are especially susceptible to erosion, and the installation of these cover materials can reduce the amount of erosion which may occur.

4. Where possible, the number of construction roads should be minimized. Construction roads are usually dirt-based and must carry heavy loads. Consequently, these areas are very prone to erosion. By minimizing these roads and using paved roads where feasible, the amount of terrain disruption can be minimized.

5. If construction is stopped for more than sixty days prior to completion of the project, the disturbed area should be reseeded.

*Note: As a guide, reference is made to the current edition of the Manual of Erosion and Sediment Control Practice for Developing Areas by the S. C. Land Resources Conservation Commission.

I. MAINTENANCE

A. PROPOSED MAINTENANCE PLAN

The present and long-term effectiveness of storm water management systems depend on how often and efficiently maintenance is performed. Design of all storm water mechanisms must be done with future ease of maintenance in mind, including accesses and easements. The applicant engaged in or conducting the development activity is responsible for maintaining all temporary and permanent storm water management devices during the development of the site. Once development is complete, some thought must be given to how the system should be maintained and who is responsible. As referred to in the storm water application form, a proposed long-term maintenance plan must be submitted before the final certification of a project. This maintenance plan must be developed for the life of any storm water management facility and must include:

1. Description of required maintenance.

2. Maintenance schedule and/or criteria.

3. Design requirements (access, clean-out traps, etc.).

4. Maintenance responsibility after project completion.

Maintenance responsibility is not intended to mean a legal commitment for maintenance in accordance with the proposed maintenance plan but rather who is expected to provide long-term maintenance of the storm water system, i.e., the developer, homeowners' association, landowner, city, county, or other body.

B. MAINTENANCE PRACTICES

Proper maintenance practices include:

1. Fertilization and vegetative practices as well as cutting and/or spraying with approved herbicides to remove undesirable vegetation.

2. Periodic removal of all trash and other foreign matter from the storm water management system(s).

3. Removal of sediment from the system(s) if:

   a. The primary outlet capacity is reduced by 25% of the maximum design discharge; and/or

   b. the storage volume is reduced by 25% of the design storage volume.

4. Repair of erosion or other damage.

5. Any other maintenance related items that obstruct the proper functioning of the storm water management system(s).

APPLICATION FOR S. C. COASTAL COUNCIL CERTIFICATION

NAME OF PROJECT: _____

I. Location

A. Check one
1. Adjacent to receiving water body. _____
2. Within 1/2 mile of receiving water body. _____
3. Beyond 1/2 mile of receiving water body. _____

B. Attach a U. S. Geological Survey Topographic Quadrangle map (1:24,000) showing project boundary and indicate the route of runoff offsite and to the nearest receiving water body.

II. Freshwater Wetlands

A. Are there any freshwater wetlands located on the property? _____

B. If yes, has the Corps of Engineers delineated/flagged these freshwater wetlands? _____

C. Attach a site plan showing the wetland delineation along with any correspondence, maps or other relevant information. If necessary, contact the U. S. Army Corps of Engineers, Regulatory Branch, Charleston District ((803) 724-4330).

III. Drainage and Storage Requirements

A. Pre vs. Post Development Runoff Requirements

The minimum storm water control requirements shall require that most developments* provide management measures necessary such that the post-development peak discharge rate for a 24-hour, 5-year frequency storm event does not exceed the 24-hour, 5-year pre-development peak discharge rate, through storm water management practices that control the volume, timing and rate of flows. (Complete Section VII.)

B. Retention and Detention Requirements

Many projects in the coastal zone will require measures to retain or detain storm water. Please consult the South Carolina Coastal Council Storm Water Guidelines for specifics. For these projects Section VII of this application should be completed, and all necessary storage and routing calculations should be attached. It is possible that other methods of calculating the amount of storage required may be acceptable but they must be verified with attached information. Also, calculations for those projects requiring storage of more than the 1st inch will have to be adjusted accordingly. (Complete Section VII.)

*Specific projects that may not be required to adhere to this certain restriction are categorized in the South Carolina Coastal Council Storm Water Management Guidelines.

IV. Best Management Practices

Indicate all of the Best Management Practices (BMP's) used in the storm water management plan and locate these BMP's on submitted plans. Provide details on plans.

Grassed Swales ____

Sheetflow ____

Rock lined ditches ____

French drains ____

Permeable pavement____

Retention basins ____

Detention basins ____

Exfiltration pipes ____

Dutch drains ____

Construction Practices ____

Outfall Structures ____

Buffer Areas between building areas & water or wetlands ____

Raised catch basins ____

Provisions for infiltrating roof drainage ____

Oil and grease filtering catch basins ____

Channeling drainage into planting areas ____

Channeling drainage into natural wetland areas ____

Other: _____

_____

_____

_____

V. Erosion and Sediment Control

Erosion and sediment control best management practices shall be used as necessary during construction to retain sediment on-site. These management practices shall be designed according to specific site conditions and shall be shown or noted on the plans of the storm water management system.

VI. Maintenance Plan

A storm water management system maintenance plan must be submitted and approved before final certification is issued. This maintenance plan should include the methods and times for which the storm water management structures are to be inspected and maintained. Consult the Storm Water Management Guidelines for further information.

VII. Drainage and Storage Data Calculations

A. Basin (or Sub-basin) No. _____ (Attach additional sheets if the site involves more than one basin or sub-basin).

B. Pre-development runoff rate = _____ (attach calculations)
Post-development runoff rate = _____ (attach calculations)

C. Post-development information

Impermeable Surfaces

Surface	% of Total Basin Area	Area (sq. ft.)	Runoff Coefficient	Adjusted Area
Streets, driveways & parking areas			x .9	
Roofs			x .9	
Other impermeable surfaces			x .9	
Total impermeable surfaces				

Other Surfaces

Surface	% of Total Basin Area	Area (sq. ft.)
Lawns & other planted areas		
Undeveloped lands		
Lagoons & other water bodies		
Other		
Total Other Surfaces		

D. For projects that require storage of the 1st inch*:
_____ sq. ft. adjusted impermeable surfaces x .083
= _____ cubic feet of storage required.

E. Indicate the volume of storage provided in the design of the storm water management system(s). _____

F. Indicate the bottom elevation of the proposed retention/detention facility. _____

G. Describe briefly the terminal discharge control method used (for example, pipe sizes with invert elevations, etc.). _____
_____
_____

H. Indicate method for release of greater than design storm events. _____
_____

I. Indicate the depth to the seasonal high water table in the area of the retention/detention facility. _____

J. Has any additional storage been provided to accommodate sedimentation? _____ If so, how large? _____
Describe area. _____
_____

K. If exfiltration systems are used, indicate:
1) SCS soil type classifications. _____
2) Depth to the seasonal high water table in the area. _____
3) Attach all necessary calculations.

VIII. Signature of Engineer or Landscape Architect

_____

Seal. _____

*Note: Some water impoundments and water control structures may be eligible for a conservation tax credit. Contact the South Carolina Land Resources Conservation Commission for further information.