SECTION 5 – POST CONSTRUCTION SITE RUNOFF CONTROL

This minimum control measure is a critical component of the stormwater management program because stormwater runoff from developed sites often flows to storm sewer systems and ultimately is discharged into local rivers and streams. Runoff from these development and/or redevelopment areas has been shown to significantly affect receiving waterbodies. Many studies indicate that prior planning and design for the minimization of pollutants in post-construction stormwater discharges is the most cost-effective approach to stormwater quality management.

There are two significant water quality impacts generally associated with post-construction runoff. The first is caused by an increase in the type and quantity of pollutants in stormwater runoff. As runoff flows over areas altered by development, it picks up harmful sediment and chemicals such as oil and grease, pesticides, heavy metals, and nutrients (e.g., nitrogen and phosphorus). These pollutants often become suspended in runoff and are carried to receiving waters, such as lakes, ponds, and streams. Once deposited, these pollutants can enter the food chain through small aquatic life, eventually entering the tissues of fish and humans.

The second significant water quality impact occurs due to the increased quantity of water delivered to the waterbody during storms. Increased impervious surfaces interrupt the natural cycle of gradual percolation of water through vegetation and soil. Instead, water is collected from surfaces such as asphalt and concrete and routed to drainage systems where large volumes of runoff quickly flow to the nearest receiving waterbody. The effects of this process include stream bank scouring and downstream flooding, which often leads to a loss of aquatic life and damage to property.

An effective post construction site runoff control program will minimize water quality impacts and attempt to maintain pre-development runoff conditions.

5.1 REQUIREMENTS

The development, implementation and enforcement of a program, or modification of an existing program is required to address stormwater runoff from new development and redevelopment projects that disturb greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development, that discharge into the departments storm sewer systems or directly to the waters of the State. The program shall ensure that controls are implemented to require appropriate infiltration practices, reduction of pervious surface, creation of or conversion to sheet flow, measures and/or structures to reduce sediment discharge and any other innovative measures that will prevent or minimize water quality impacts and including the following.

5.1.1 The development and implementation or modification of strategies which include a combination of structural and / or non-structural best management practices.

5.1.2 Use of an ordinance, regulatory mechanism or procedures to address post construction runoff from new development and redevelopment projects to the extent allowable under State law.

5.1.3 Ensure long term operation and maintenance of Best Management Practices.

Appropriate BMP's and measurable goals for this minimum control measure must be determined. These must include the persons(s) or position(s) responsible and implementation dates for each BMP.

5.2 BEST MANAGEMENT PRACTICES

The following BMP's will be utilized in the implementation of the program to address the minimum control measure for Post Construction Site Runoff Control.

5.2.1 Requirements for Structural and Non-Structural BMP's

The department will require structural and non structural BMP's for projects disturbing greater than or equal to one (1) acre.

The criteria are intended to help evaluate stormwater discharges and the methods that may be used for the treatment of stormwater before it reaches an outlet.

The following is a summary of the memorandum which indicates recommended design guidelines and possible BMP's / treatment measures. Storm sewer systems will be designed in accordance with the CTDOT Drainage Manual and supplements thereto.

For drainage systems containing four to ten catch basins which discharge within fifty feet of a regulated area where applicable;

- Eliminate curbing, design for sheet flow and utilize natural vegetation to help filter particulates. On steep embankment slopes, erosion protection measures should be employed.

- Utilize oversized catch basins with four-foot deep sumps. It may be justified to provide six-foot sumps at the last two catch basins in the system if there are no conflicts with groundwater, ledge rock, rights-of-way or underground utilities. If end treatments such as hydrodynamic separators (gross particle separators) wet ponds or detention basins are constructed at the terminus of the drainage system, deep catch basin sumps can be eliminated. Additionally, sumps (any depth) should not be specified for any manholes or for catch basins on storm drainage systems which are 36 inches or greater in diameter.

At all locations where deep sumps are specified, the maximum depth of structure shall not exceed twelve feet as measured from the top-of-grate elevation.

- Utilize outlet protection such as riprap energy dissipators; scour holes, stone check dams erosion control matting and vegetative linings in outlet channels.

For drainage systems containing ten or more catch basins which discharge within fifty feet of a regulated area where applicable;

Outlet areas shall be designed so that an open channel with check dams, a sediment basin, or a combination of both is specified; these shall be designed to accommodate the peak runoff associated with the "first flush", known as Water Quality Flow (WQF). The last option is to specify a Hydrodynamic Separator also known as a Gross Particle Separator.

Studies related to the efficiency of these chambers with respect to stormwater treatment are ongoing. Pending the publication and review of specific performance data, the following guidelines shall be applied**:**

- Hydrodynamic separators shall be designed to accommodate the peak runoff associated with the "first flush", known as the Water Quality Flow (WQF). The WQF shall be determined using the procedures outlined in Chapter 11, Appendix C of the Drainage Manual.

- Chambers shall be placed "off-line" and a bypass system shall be designed to convey the peak flow rate for the design storm.

- Hydrodynamic separators are best suited for the treatment of storm runoff from site drainage related to transportation facilities such as bus or train stations, maintenance garages, rest areas or commuter parking lots. Roadway applications should be limited primarily to urban areas.

The number of catch basins refers to the combined total of existing and proposed State maintained structures. The following items describe situations wherein catch basin inlets need not be included in the overall structure count:

- Inlets on town maintained systems or within private developments adjoining State highways which connect to the State system as long as a distinct separation point (catch basin or manhole) exists or will be constructed at the junction of the two facilities. This will allow access for testing purposes should water quality issues arise at the discharge point of the State system.

- Catch basins located in grassed areas 20 feet or more from the

pavement edge.

- Ancillary catch basins that are internal to the drainage area and contribute no additional runoff to the storm sewer system such as flanker basins, basins intended to improve intersection drainage or inlets placed on steep grades to increase interception.

Additional BMP's may include the following:

Structural BMP's

Ponds

- Dry Extended Detention Ponds
- Sedimentation Basin
- Wet Ponds

Photograph of Dry Extended Detention Pond

Infiltration Practices

- Infiltration Basin
- Infiltration Trench

Filtration Practices

- Bioretention

Vegetative Practices

- Stormwater Wetland
- Grassed Swales
- Grassed Filter Strip
- Interlocking Reinforced Grass Panels (Limited to Merritt Parkway)

Runoff Pretreatment Practices

- Manufactured Products (Swirl separators, or hydrodynamic structures)

Photograph of Grassed Swale

Detention and retention structures will be utilized to limit increases in peak flow rates and volumes when required by CTDEP Inland Water Resource permit requirements. These facilities will be designed and constructed in accordance with the CTDOT Drainage Manual and Connecticut Guidelines for Soil Erosion and Sediment Control.

Non-Structural BMP's

- Urban Foresty (Use of trees, plantings and landscaped areas around parking lots)
- Limiting Curbs and Gutters for roadways
- BMP Inspection and Maintenance

Photograph of Outlet Structure Requiring Maintenance

Several documents are utilized for establishing guidelines and procedures for addressing post construction runoff in planning, design and construction for state owned, state funded projects or projects tying into a state owned system. These documents include the following:

- CTDOT Drainage Manual, October 2000 and supplements thereto
- Connecticut Guidelines for Soil Erosion and Sediment Control, DEP Bulletin 34, 2002 and supplements thereto

CTDOT Drainage Manual

This document contains guidelines and procedures for the design of several of the structural BMP's including roadside channels, outlet protection, bank protection, rock riprap design and storage facilities as well as detention and retention ponds.

The design of outlet protection for all projects being designed or funded by the department shall be in accordance with the Drainage Manual rather than the Connecticut Guidelines for Soil Erosion and Sediment Control. Outlet protection is discussed and the procedures for designing outlet protection are contained in chapter

11.13 of the Drainage Manual. The methodology outlined in the Drainage Manual has been accepted by the CTDEP for use by the department.

Connecticut Guidelines for Soil Erosion and Sediment Control

These guidelines are referenced by the department's design manuals and made part of contracts by inclusion in the department's standard specifications.

The guidelines contain information / procedures for the design of several BMP's for stabilization structures, drainage ways and watercourses, detention structures and energy dissipaters.

The measurable goals, target dates and responsible position associated with this BMP are detailed in the following table.

Table 5.1 Requirements for Structural and Non Structural BMP's, Measurable Goals and Implementation Dates

Target Date	Activity	Position Responsible
Year 1 - 5	Continue implementation of BMP's including projects with greater than or equal to 1 acre in disturbance area	Bureau Chief Arthur W. Gruhn

5.2.2 Procedures for Addressing Post Construction Runoff from Construction and Reconstruction Projects

By issue of internal memorandum to all department units, stormwater management BMP's are required for all projects.

The measurable goals, target dates and responsible position associated with this BMP are detailed in the following table.

Table 5.2 Procedures for Addressing Post Construction BMP, Measurable Goals and Implementation Dates

Target Date	Activity	Position Responsible
Year 1 - 5	Continue procedures for addressing post construction BMP's including projects with greater than or equal to 1 acre in disturbance area	Bureau Chief Arthur W. Gruhn

5.2.3 Ensuring Long Term Operation and Maintenance of Best Management Practices

The department is divided into four maintenance districts across the state. Each maintenance district will be responsible for the long term operation and maintenance of the department's facilities in each of the respective districts. Maintenance for rails will be handled by the Office of Rails. This will include storm sewer maintenance

including cleaning and maintenance of catch basins, stormwater treatment systems and detention / retention and sedimentation structures.

Long term operation and maintenance of best management practices shall be in accordance with Section 6 – Good Housekeeping / Pollution Prevention of this plan.

The measurable goals, target dates and responsible position associated with this BMP are detailed in the following table.

Table 5.3 Ensuring Long Term Operation and Maintenance of Best Management Practices, Measurable Goals and Implementation Dates

Target Date	**Activity**	**Position Responsible**
Year 1 - 5	Continue operation and maintenance of BMP's	Bureau Chief Arthur W. Gruhn