Stormwater Pond

Stormwater BMP Type

Pretreatment BMP	□
Infiltration BMP	□
Filtering BMP	□
Stormwater Pond BMP	■
Stormwater Wetland BMP	□
Water Quality Conveyance BMP	□
Stormwater Reuse BMP	□
Proprietary BMP	□
Other BMPs and Accessories	□

Stormwater Management Suitability

Retention	□
Treatment	■
Pretreatment	□
Peak Runoff Attenuation	■

Pollutant Removal

Sediment*	**High**
Phosphorus	**Moderate**
Nitrogen	**Moderate**
Bacteria	**Moderate**

*Includes sediment-bound pollutants and floatables (with pretreatment)

Implementation

Capital Cost	**Medium**
Maintenance Burden	**Medium**
Land Requirement	**High**

Description

Stormwater ponds are designed to retain a permanent pool of water that provides treatment for the water quality storm event and peak runoff attenuation for larger storms. This section addresses four types of stormwater ponds:

- Wet Pond
- Micro pool Extended Detention Pond
- Wet Extended Detention Pond
- Multiple Pond System

Stormwater is treated primarily through sedimentation, as suspended particles and attached pollutants settle to the bottom of the pond. Stormwater ponds can also reduce soluble pollutants in stormwater discharges by adsorption to sediment, bacterial decomposition, and the biological processes of aquatic and fringe wetland vegetation.

The key to maximizing the pollutant removal effectiveness of stormwater ponds is maintaining a permanent pool of water. To achieve this, the bottom of stormwater ponds should be located below the seasonal high groundwater table or should have a sufficiently large contributing drainage area and an impermeable liner if located in permeable soils. The pool typically operates on the instantaneously mixed reservoir principle where incoming water mixes with the existing pool and undergoes treatment through sedimentation and other processes. When the existing pool is at or near the pond outlet or when the primary flow path through the pond is highly linear, the pond may act as a plug flow system in which incoming water displaces the permanent pool, which is then discharged from the pond. In this process, a portion of the "new" polluted runoff enters the pond as the "old" treated water is discharged from the pond, thereby allowing treatment of the Water Quality Volume (WQV). When designed in an on-line

configuration, stormwater ponds can also be sized to treat and provide peak runoff attenuation for storms larger than the water quality storm event.

The permanent pool of a stormwater pond reduces the velocity of incoming water to prevent resuspension of particles and promote settling of newly introduced suspended solids. The energy dissipating and treatment properties of the permanent pool are enhanced by aquatic vegetation, which is an essential part of the stormwater pond design. In contrast, a dry extended detention basin, which has no permanent pool, is not suitable for stormwater treatment due to the potential for resuspension of accumulated sediment by incoming storm flows during the early portion of a storm event when the basin is empty.

Stormwater ponds do not provide sufficient retention or runoff volume reduction through infiltration or other processes and therefore cannot be used to meet the Standard 1 retention performance criterion of this Manual.

Advantages

- Effective for removal of particulate and soluble pollutants.
- Can provide an aesthetic benefit if open water is desired as part of an overall landscaping plan.
- Can provide wildlife habitat with appropriate design elements.
- Can provide peak runoff attenuation.

Limitations

- Do not provide infiltration or sufficient runoff volume reduction, and therefore cannot be used to meet the Standard 1 retention performance criterion.
- Unlined ponds that intercept groundwater have potential to impact groundwater quality if dissolved pollutants are present in the runoff.
- Lined ponds typically require a minimum drainage area in order to maintain a permanent pool, which may become difficult during extended dry periods.
- Require a relatively large land area.
- May cause thermal impacts to receiving waters and therefore should not discharge directly to Coldwater streams or other receiving water environments that are sensitive to thermal loads.
- Ponds with steep side slopes and/or deep wet pools may present a safety risk in residential areas and areas with public access.
- Stormwater ponds can serve as decoy wetlands, intercepting breeding amphibians moving toward vernal pools. If amphibians deposit their eggs in these artificial ponds, they rarely survive due to the sediment and pollutant loads, as well as fluctuations in water quality, quantity, and temperature.

Siting Considerations

- **Drainage Area:** Stormwater ponds that utilize a liner system should have a contributing drainage area that is adequate to maintain minimum water levels. Typically, the minimum contributing drainage area for lined ponds is 10 acres. Smaller drainage areas may be suitable if intercepting groundwater or with sufficient surface runoff to support a permanent pool. A water budget analysis should be performed to demonstrate that sufficient groundwater flow and/or surface runoff is available to maintain the permanent pool depth.

- **Groundwater:** Stormwater ponds should intercept groundwater or have an impermeable liner to maintain a permanent pool if located in permeable soils. The elevations of unlined ponds should be established such that the groundwater elevation is equal to the desired permanent pool elevation. Seasonal variations of groundwater elevations should be considered.

- Land Uses: Land uses will dictate potential pollutants-of-concern and potential safety risks. A liner is required for stormwater ponds that receive runoff from Land Uses with Higher Potential Pollutant Loads (LUHPPLs) (see Chapter 10 - General Design Guidance for Stormwater Infiltration Systems) or on contaminated sites. The pond's permanent pool may pose a safety risk in residential areas and areas with public access, sometimes requiring fencing to limit access to the pond.

- Baseflow: A small amount of baseflow is desirable to maintain circulation and reduce the potential for low dissolved oxygen levels during late summer. This baseflow can be provided by groundwater discharge to the pond or the drainage system that feeds the pond.

- **Site Slopes:** Site slopes greater than 6% may result in the need for an embankment greater than 4 feet above existing grade to provide the desired storage volume, which would be subject to CT DEEP dam safety regulatory requirements. Steep slopes may also present design and construction challenges, and significantly increase the cost of earthwork.

- **Receiving Waters:** Stormwater ponds should not be used for sites that discharge within 200 feet of coldwater streams, 200 feet from a public water supply reservoir, or 100 feet from streams tributary to a public water supply reservoir.

- **Natural Wetlands/Vernal Pools:** Natural wetlands and vernal pool depressions should not be used, either temporarily or permanently, as a stormwater pond. Stormwater ponds should be located at least 750 feet from a vernal pool. They should not be sited between vernal pools, or in areas that are known primary amphibian overland migration routes.

Soil Evaluation and Water Budget Analysis

- Conduct an evaluation of the soil characteristics and subsurface conditions at the location of the proposed system including soil type, depth to the seasonal high groundwater table, and depth to bedrock. Perform test pits or soil borings in accordance with the soil evaluation guidance in Chapter 10 - General Design Guidance for Stormwater Infiltration Systems.

- A water budget analysis should be performed for stormwater pond designs. The water budget consists of calculations, on a daily basis, of the inflows to and outflows from the pond to show that the required depth of water in the pond is maintained throughout the year. The analysis should be performed for a wet year, a dry year, and an average year. The analysis should demonstrate that the permanent pool of the stormwater pond meets the minimum requirements of this section for all of the days in each of the three analyses. All of the inputs to and outputs from the pond should be considered, including direct precipitation, runoff, flooding, groundwater inflow, evapotranspiration, groundwater outflow, and anu reuse of the pond water such as irrigation.

Design Recommendations

General Considerations

This section addresses the following types of stormwater pond designs:

- **Wet Pond:** A wet pond typically consist of two major components - a forebay and a permanent wet pool. The forebay provides pretreatment by capturing coarse sediment particles to minimize the need to remove the sediments from the primary wet pool. The wet pool serves as the primary treatment mechanism and where much of the storage capacity exists. Wet ponds can be sized for a wide range of watershed sizes, if adequate space exists. For example, a variation on the conventional wet pond, sometimes referred to as a "pocket pond", is intended to serve relatively small drainage areas (between one and five acres). Because of these smaller drainage areas and the resulting lower hydraulic loads of pocket ponds, outlet structures can be simplified and often do not have safety features such as emergency spillways and low-level drains. Figure 13-22 depicts a typical schematic design of a conventional wet stormwater pond, while Figure 13-23 shows a typical schematic design of a modified wet pond or "pocket pond."

Several adaptations of this basic design have been developed to achieve the specific treatments goals of various watershed or site conditions. These wet pond design variations are described below.

- **Micropool Extended Detention Pond:** Micropool extended detention ponds are primarily used for peak runoff control and utilize a smaller permanent pool than conventional wet ponds. While micropool extended detention ponds are not as efficient as wet ponds for the removal of pollutants, they should be considered when a large open pool might be undesirable or unacceptable. Undesirable conditions could include thermal

impacts to receiving streams from a large open pool, safety concerns in residential areas, or where maintaining a large open pool of water would be difficult due to a limited drainage area or deep groundwater.

Micropool extended detention ponds are also efficient as a stormwater retrofit to improve the treatment performance of existing dry detention basins. Figure 13-24 depicts a typical schematic design of a micropool extended detention pond.

- **Wet Extended Detention Pond:** These ponds are very similar to wet ponds with the exception that their design is more focused on attenuating peak rates of runoff. As a result, more storage volume is committed to managing peak flows as opposed to maximizing the wet pool depth. The configuration of the outfall structure may also differ from typical wet pond designs to provide additional storage volume above the level of the permanent pool. Figure 13-25 depicts a typical schematic design of a wet extended detention pond.

- **Multiple Pond System:** Multiple Pond systems consist of several wet pools that are constructed in a series following a forebay. The advantage of these systems is that they can improve treatment efficiency by better simulating plug flow conditions as compared to a single large wet pool. Also, these systems can reduce overall maintenance needs since more frequent maintenance would be performed within the first pool cells as opposed to the large, primary pool. The disadvantage of these systems is that they typically require more land area to treat the WQV. Figure 13-26 depicts a typical schematic design of a multiple pond system.

Pretreatment – Sediment Forebay

- A sediment forebay is recommended for all wet pond systems, although other forms of pretreatment may be used at locations where runoff enters the stormwater pond.

- The sediment forebay and other pretreatment measures should be designed in accordance with the Pretreatment BMPs section of this Manual.

- The sediment forebay should be sized to contain at least 10% of the WQV. The forebay storage volume may be used to fulfill the WQV requirement of the overall stormwater pond. The forebay should also include additional sediment storage volume that may not be used for WQV calculations.

Sizing and Dimensions

- The pond volume, including the volume of the sediment forebay, permanent pool, and extended detention area, should be equal to or exceed the WQV. A larger volume should be used to achieve greater pollutant removal when it is necessary to meet specific water quality standards. The recommended division of storage between the forebay, permanent pool, and extended detention is outlined in Table 13-10.

Table 13-7. Water Quality Volume Distribution in Stormwater Pond Designs

Design Variant	Percent of Water Quality Volume (WQV)		
	Sediment Forebay	Permanent Pool	Extended Detention
Wet Pond	10%	90%	0%
Micropool Extended Detention Pond	10%	10%	80%
Wet Extended Detention Pond	10%	40%	50%
Multiple Pond System	10%	40%	50%
Pocket Pond	10%	40%	50%

Source: NYDEC, 2001.

- Water quality storage can be provided in multiple cells. Performance is enhanced when multiple treatment pathways are provided by using multiple cells, longer flow paths, high surface area to volume ratios, complex microtopography, and/or redundant treatment methods (combinations of pool, extended detention, and marsh).
- The extended detention storage volume (storage volume above the permanent pool provided for additional water quality and stormwater quantity control) should drain out of the pond over a minimum of 24 hours, after which the water surface elevation in the pond will return to the permanent pool elevation.
- Underwater or marsh berms may be incorporated in the design to lengthen the flow path through the pond.
- Thermal impacts of stormwater ponds may be mitigated by implementing one or more of the following design measures:
  - Use of a smaller permanent pool with more extended detention storage and an extended detention time of 24 hours or less
  - Planting of shade trees around the perimeter of the pond (but at least 25 feet away from inlet/outlet structures and the pond embankment) to reduce solar warming of the pool
  - Designing the pond with a series of pools, as opposed to a single pool, to allow cooling prior to discharge
  - Use of an outlet structure designed to draw water from near the bottom of the pond where water temperatures may be cooler
  - Use of an underdrained gravel trench outlet.
- The pond should have a curvilinear shape and a minimum length: width ratio of 3:1 from the pond inlet to outlet.

- Upper stages of the pond should provide temporary storage of larger storms (2-year, 10-year, and 100-year, 24-hour events) to control peak discharge rates.
- Provide variable pond depths of 4 to 6 feet but not exceeding depths of 8 feet. Maintaining pond water depths in excess of 4 feet precludes invasive emergent vegetation such as cattails. Emergent vegetation provides mosquito larvae with refuge from predators and increases nutrient availability.
- Maintain pond water quality sufficient to support mosquito-feeding fish. Stormwater ponds often develop mini ecosystems where birds, frogs, and other insects feed, many of which are natural predators of mosquitoes and nuisance insects. Ponds can also be stocked with predatory fish native to Connecticut that feed on mosquito larvae such as banded sunfish, flathead minnows, Eastern mud minnows, and several species of killifish. The CT DEEP Fisheries Division should be consulted regarding species selection. Other natural predators of mosquitoes such as dragonfly nymphs can also be used.
- Pumping of groundwater to maintain the permanent pool should not be allowed.
- The volume below the surface elevation of the permanent pool should not be included in storage calculations for peak flow management.

Side Slopes

- 3(H):1(V) slopes or flatter are preferred.
- The perimeter of permanent pool areas four feet or greater in depth should provide two benches:
    - Provide a flat safety bench that extends 10 feet outward from the normal water edge to the toe of the pond side slope.
    - Provide a flat aquatic bench that extends 10 feet inward from the normal water edge at a depth of 12-18 inches below the normal pool water surface elevation.

Inlet

- Design the inlet in accordance with the Inlet and Outlet Controls section of this Manual.
- The number of inlets should be minimized, and one inlet is preferable. The inlet should be located at the most hydraulically remote point from the outlet to minimize the potential for short-circuiting and should be located in a manner that meets or exceeds desired length to width ratios.
- The ideal inlet configuration is above the permanent pool to prevent potential hydraulic constrictions due to freezing.

Outlet & Overflow

- Design the outlet and any overflows in accordance with the Inlet and Outlet Controls section of this Manual.
- Stormwater ponds should have an outlet structure sized to convey up to the 10-year, 24-hour storm event, at a minimum, to the storm drainage system or stabilized channel. An emergency spillway is required to convey the 100-year storm event if the outlet structure is not designed to pass the 100-year storm event. Off-line systems should be designed with a bypass or overflow for flows in excess of the water quality storm.

Conveyance

- Stormwater should be conveyed to and from all stormwater management practices safely and to minimize erosion potential.
- Stabilize any portion of the stormwater pond with Turf Reinforcement Matting (TRM) to limit erosion in locations where flow velocities exceed 3 to 5 feet per second (depending on soil and vegetation types) for the 1-year, 24-hour storm event.
- TRM should be a woven material included on the CTDOT Qualified Products List that exceeds the design velocity of the design storm and allows for the growth of the proposed vegetative species.

Liner

- When a stormwater pond is located such that the bottom of the pond does not intercept groundwater and the pond is located in permeable soils, an impermeable liner is needed to maintain a permanent pool of water. Pond liners are also necessary to avoid impacts to groundwater quality for stormwater ponds that receive runoff from Land Uses with Higher Potential Pollutant Loads (LUHPPLs) or on contaminated sites.
- If used, should consist of a 30 mil (minimum) HDPE or PVC liner, or one of the alternative liner systems described in Chapter 10 - General Design Guidance for Stormwater Infiltration Systems with the approval of the review authority.

Non-clogging Low-Flow Orifice

- A low-flow orifice should be provided, with the size of the orifice sufficient to avoid clogging (recommended minimum orifice diameter of 6 inches, although orifice diameters as small as 3 inches are allowed if required to provide the necessary hydraulic control). The low flow orifice should be protected from clogging using an external trash rack.
- A submerged reverse-slope pipe may also be used that extends downward from the riser to an inflow point one foot below the normal pool elevation.

- Alternative methods are to employ a broad crested rectangular, V-notch, or proportional weir, protected by a half-round pipe that extends at least 12 inches below the normal pool level.

Riser in Embankment

- The riser should be located within the embankment for maintenance access and safety.
- Lockable manhole covers and manhole steps within easy reach of valves and other controls should provide access to the riser.

Drain

- For stormwater ponds that do not intercept groundwater, the design may include a drainpipe that can completely or partially drain the pond. The drainpipe should have an elbow or protected intake within the pond to prevent sediment deposition in the pipe, and a diameter capable of draining the pond within 24 hours.
- Care should be exercised during draining to prevent rapid drawdown and minimize downstream discharge of sediments or anoxic water. The review/approving authority should be notified before draining the system.

Adjustable Gate Valve

- Both the WQV extended detention pipe and the drain may be equipped with an adjustable gate valve, typically a handwheel activated knife gate valve.
- Valves should be located inside of the riser at a point where they will not normally be inundated and can be operated in a safe manner.
- Both the WQV extended detention pipe and the drain should be sized one pipe size greater than the calculated design diameter.
- To prevent vandalism, the handwheel should be chained to a ringbolt, manhole step, or other fixed object.

Vegetation

- Aquatic plantings around the edge of the pond can provide pollutant uptake, stabilize the soil at the edge of the pond, and improve habitat. Maintaining high vegetation along the edge of the pond (not mowing to the edge) can also deter waterfowl access and filter pollutants.
- Select vegetation and develop a planting plan with the guidance provided in Appendix F of this Manual.

- Wetland plantings should be included in a pond design, either along the aquatic bench (fringe wetlands), the safety bench and side slopes, or within shallow areas of the pool.
- The best depth for establishing wetland plants, either through transplantation or volunteer colonization, is within approximately six inches of the normal pool elevation.
- Soils should be modified (e.g., scarified or tilled) to mitigate compaction that occurs during construction around the proposed planting sites.
- Avoid species that require full shade, are susceptible to winterkill, or are prone to wind damage.
- Woody vegetation may not be planted or allowed to grow within 25 feet of the toe of the embankment and 25 feet from the principal spillway structure.
- Existing trees should be preserved in the buffer area during construction. It is desirable to locate forest conservation areas adjacent to ponds. To help discourage resident geese populations, the buffer can be planted with trees, shrubs, and native ground covers.
- Annual mowing of the pond buffer is only required along maintenance rights-of-way and the embankment. The remaining buffer can be managed as a meadow (mowing every other year) or forest.
- Plant the pond with salt-tolerant vegetation if the stormwater pond receives road runoff.

Safety Features

- The principal spillway opening must not permit access by small children, and end walls above pipe outfalls greater than 48 inches in diameter should be fenced to prevent a hazard.

- Both the safety bench and the aquatic bench may be landscaped to prevent access to the pool.

- Fencing around the perimeter of the pond is generally not encouraged but may be required by some municipalities. The preferred method is to grade the pond to eliminate drop-offs or other safety hazards.

Maintenance Reduction Features

- Ponds should be designed with non-clogging outlets, such as a weir, or by incorporating trash racks for culverts and orifice openings.

- To prevent clogging from ice or floatables, a reverse slope outlet pipe can be used to draw water from below the permanent pool up to the outlet structure. The invert of the pipe drawing from the pool should be at least 18 inches from the bottom to prevent sediment discharge.

- Orifices should be less than 6 inches in diameter with a trash rack to prevent clogging. Smaller orifice diameters (3 inches or larger) are allowed if required to provide the necessary hydraulic control.
- Ponds should have a manually operated drain to draw down the pond for infrequent maintenance or dredging of the main cell of the pond.
- Metal components of outlet structures should be corrosion resistant, but not galvanized due to the contribution of zinc to water.
- Outlet structures should be resistant to frost heave and ice action in the pond.

Cold Climate Design Considerations

The following design elements should be considered to minimize potential performance impacts caused by cold weather:

- Inlet pipes should not be submerged since this can result in freezing and upstream damage or flooding.
- Bury pipes below the frost line to prevent frost heave and pipe freezing. Bury pipes at the point furthest from the pond deeper than the frost line to minimize the length of pipe exposed.
- Increase the slope of inlet pipes to a minimum of 1 percent, if site conditions allow, to prevent standing water in the pipe and reduce the potential for ice formation.
- If perforated riser pipes are used, the minimum orifice diameter should be 0.5 inches. In addition, the pipe should have a diameter of at least 6 inches.
- When a standard weir is used, the minimum slot width should be 3 inches, especially when the slot is tall.
- Baffle weirs can prevent ice formation near the outlet by preventing surface ice from blocking the inlet, encouraging the movement of base flow through the system.
- Riser hoods and reverse slope pipes should draw from at least 6 inches below the typical ice layer. This design encourages circulation in the pond, preventing stratification and formation of ice at the outlet. Reverse slope pipes should not be used for off-line ponds.
- Trash racks should be installed at a shallow angle to prevent ice formation.
- Additional storage should be provided to account for storage lost to ice buildup. Ice thickness may be estimated by consulting with local authorities (e.g., the fire department) with knowledge of the typical ice thickness in the area.

Winter Operations

- Stormwater ponds should not be used as dedicated snow storage areas. To the extent feasible, locate and design the system to avoid snow storage areas and potential damage from snow plowing activities. Refer to Chapter 7 - Overview of Structural Stormwater Best Management Practices for general design considerations related to winter operations.

Construction Recommendations

- The designing qualified professional should develop a detailed, site-specific construction sequence.

- The designing qualified professional should inspect the installation during the following stages of construction, at a minimum:
  - After excavation of the pond
  - After internal grading of microtopography, berms, safety benches, etc.
  - After installation of bypass, outlet/overflow, and inlet controls
  - After vegetation and wetland plants/seed mix has been installed

- The designing qualified professional should provide an as-built plan of the completed system along with a certification that the system was designed in accordance with the guidance contained in this Manual and other local or state requirements and that the system was installed in accordance with the approved plans.

- The entire contributing drainage area should be completely stabilized prior to directing any flow to the system. Adequate vegetative cover must be established over any pervious area adjacent or contributing to the system before runoff can be accepted.

- Erosion and sediment controls should be in place during construction in accordance with the Connecticut Guidelines for Soil Erosion and Sediment Control and the Soil Erosion and Sediment Control (SESC) Plan developed for the project.

- Temporary dewatering may be required if excavation extends below the water table. Appropriate sedimentation controls will be required for any dewatering discharges.

- During clearing and grading of the site, measures should be taken to avoid soil compaction at the location of the proposed system to promote growth of vegetation.

- The system should be fenced off during the construction period to prevent disturbance of the soils.

- The system should be excavated to the dimensions, side slopes, and elevations shown on the plans. The method of excavation should avoid compaction of the bottom of the pond. A hydraulic excavator or backhoe loader, operating outside the limits of the system, should

be used to excavate the system. Excavation equipment should not be allowed within the limits of the system.

- Install vegetation in accordance with the planting plan and plant schedule on the plans. Water vegetation thoroughly immediately after planting and as necessary until fully established.

- Stormwater ponds classified as dams under the CT DEEP dam safety program (generally those with embankments greater than 4 feet above existing grade) should be constructed, inspected, and maintained in accordance with applicable CT DEEP dam safety regulations and guidance.

Maintenance Needs

- Detailed inspection and maintenance requirements, inspection and maintenance schedules, and those parties responsible for maintenance should be identified on the plans and in the Stormwater Management Plan.

- Maintenance should be detailed in a legally binding maintenance agreement.

- Maintenance activities such as sediment removal, mowing, and repairs should be performed with rakes and light-weight equipment rather than heavy construction equipment to avoid soil compaction and damage to vegetation. Heavy equipment may be used for sediment removal and other maintenance activities if the equipment is positioned outside the limits of the system. Heavy construction equipment should not be allowed within the limits of the system for maintenance purposes.

Maintenance Access

- Stormwater ponds should be designed with easy access to all components of the system for maintenance purposes. In addition to the maintenance reduction design factors described in this section, also refer to Chapter 7 - Overview of Structural Stormwater Best Management Practices for general design considerations to reduce and facilitate system maintenance.

- A maintenance right-of-way or easement should extend to the pond from a public road.

- Maintenance access should be at least 12 feet wide, have a maximum slope of no more than 15 percent, and be appropriately stabilized to withstand maintenance equipment and vehicles.

- The maintenance access should extend to the forebay, safety bench, riser, and outlet and be designed to allow vehicles to turn around.

- The principal spillway should be equipped with a removable trash rack, and generally accessible from dry land.

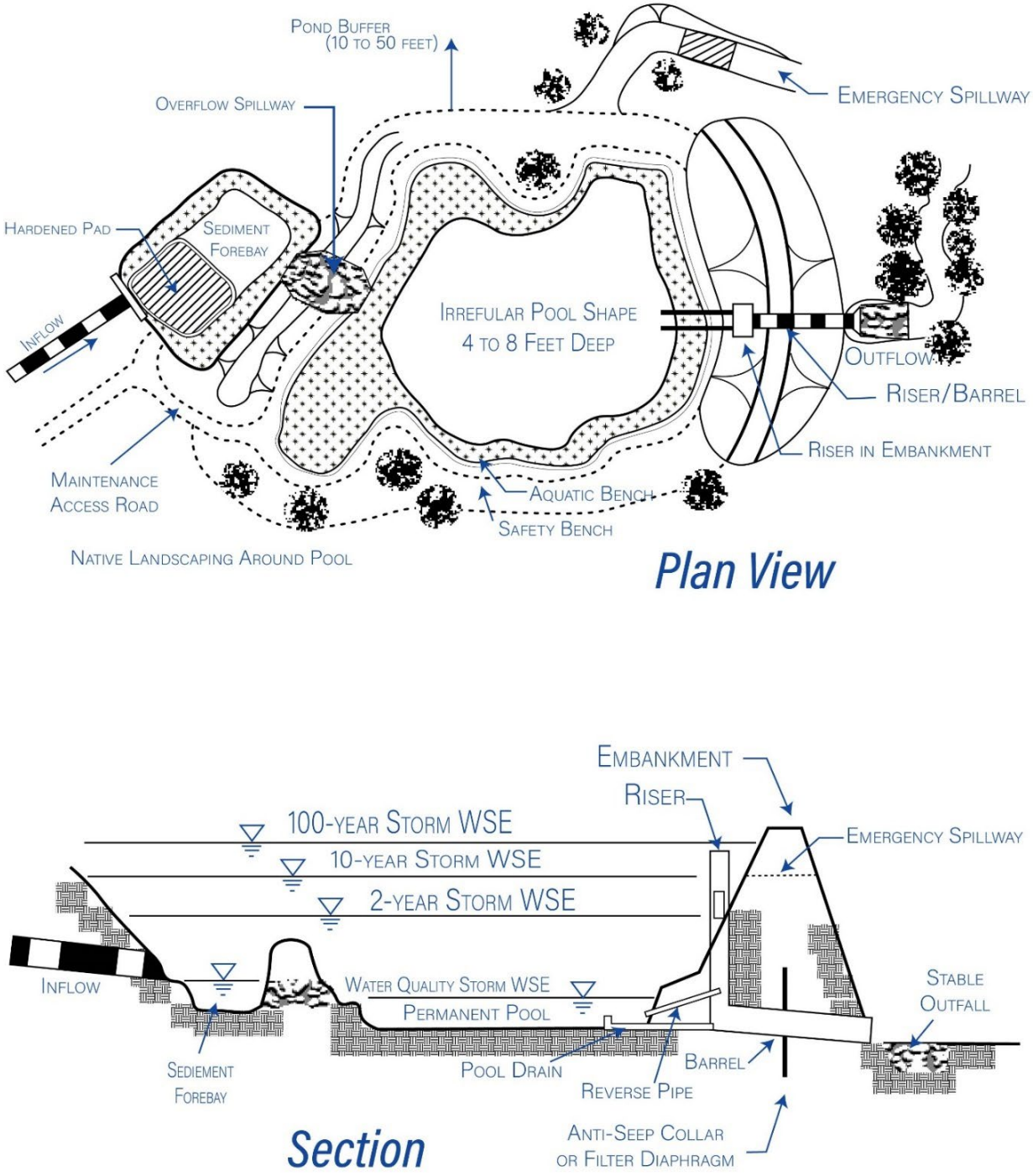
Recommended Maintenance Activities

- Inspect after major storms (1 inch or more of precipitation) in the first few months following construction.
- Inspect sediment forebay twice per year and the rest of the system annually, including inlet and outlet control structures and the pond embankment.
- Refer to Appendix B for maintenance inspection checklists, including items to focus on during the inspections.
- Remove trash and organic debris (leaves) in the Spring and Fall.
- Remove sediment from the sediment forebay or other pretreatment area when it accumulates to a depth of more than 24 inches or 50% of the design depth.
- Remove sediment from the permanent pool when the pool volume has become reduced significantly, or when significant algal growth is observed.
- The vegetative cover should be maintained at 85%. If vegetation has damage, the area should be reestablished in accordance with the original specifications.
- Periodically mow the pond side slopes during the growing season. Maintain side slope vegetation at 6 inches or higher. High grass along the pond edge will discourage waterfowl from taking up residence and serve to filter pollutants.
- Inspect and remove invasive vegetation as necessary.
- Inspect wetland plants and manage/harvest dead or dying plants as necessary.
- Remove trees and woody vegetation within 25 feet of all risers, pipe outlet structures, spillways, and downstream embankments that hold back water.
- Prune other woody vegetation where dead or dying branches are observed. Plant reinforcement plantings as necessary.

Other References

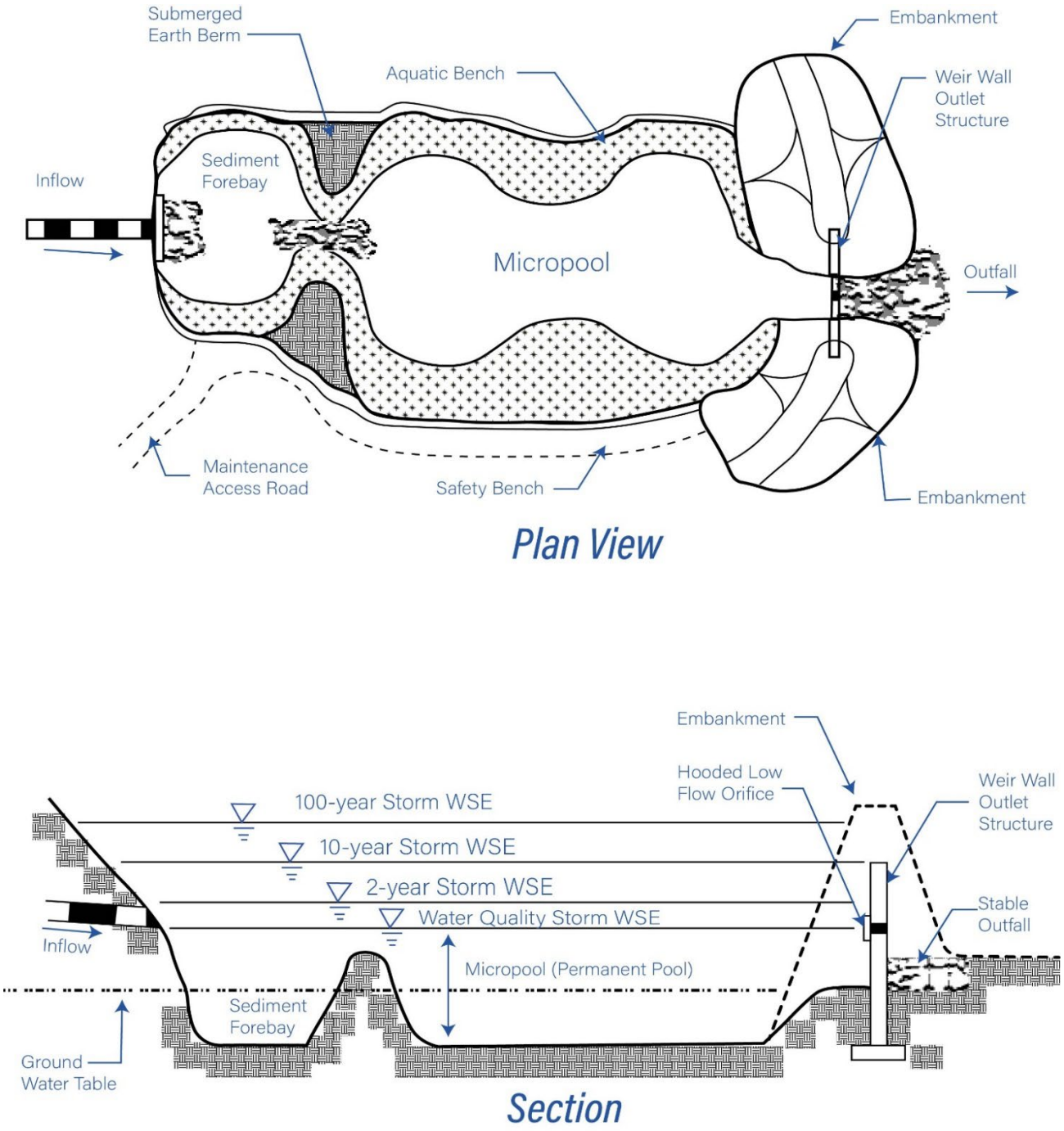
New York State Department of Environmental Conservation (NYDEC). 2001. *New York State Stormwater Management Design Manual.* Prepared by Center for Watershed Protection. Albany, New York.

Figure 13-22. Wet Pond Schematic



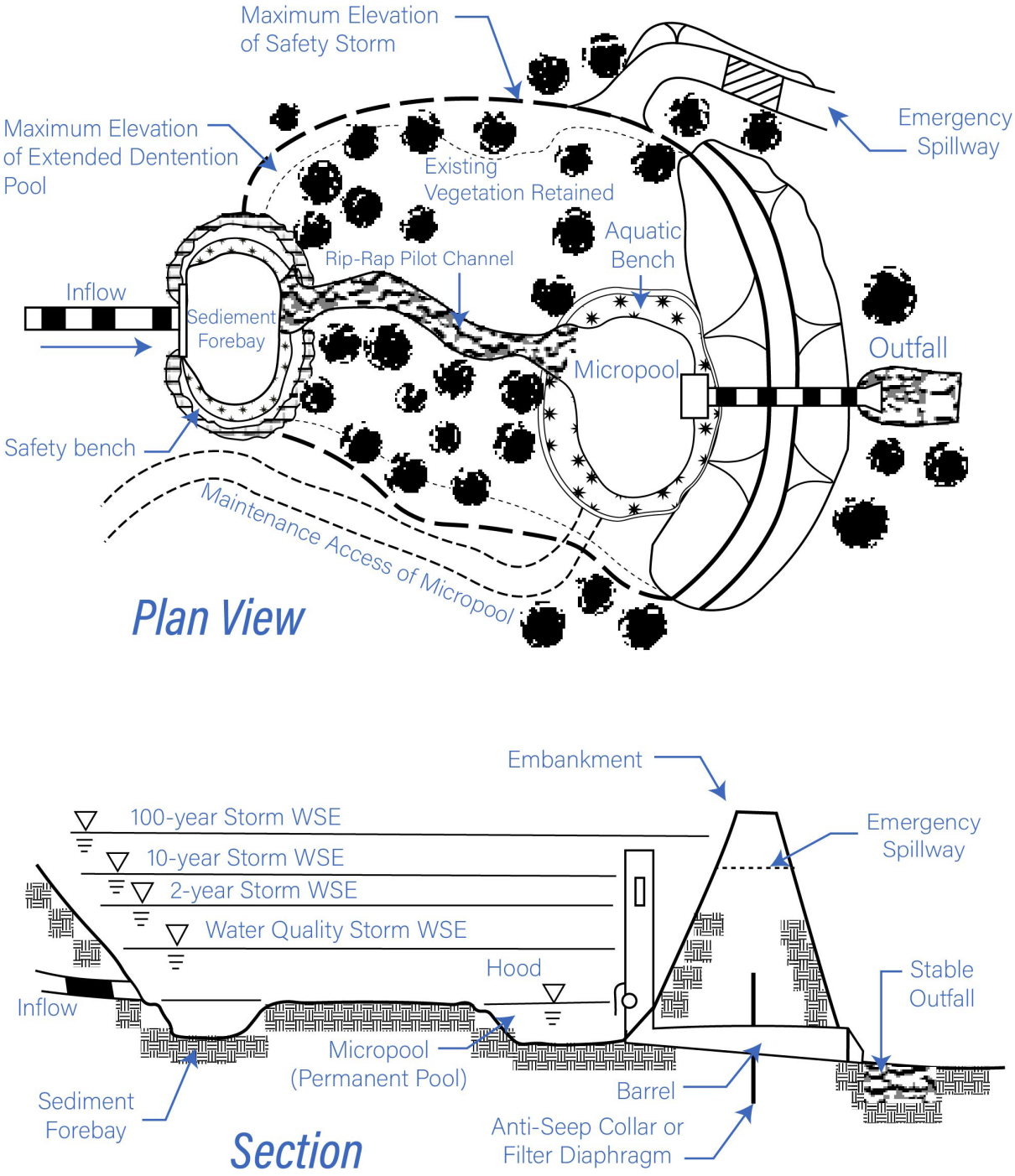
Source: Adapted from NYDEC, 2001.

Figure 13-23. Pocket Pond Schematic



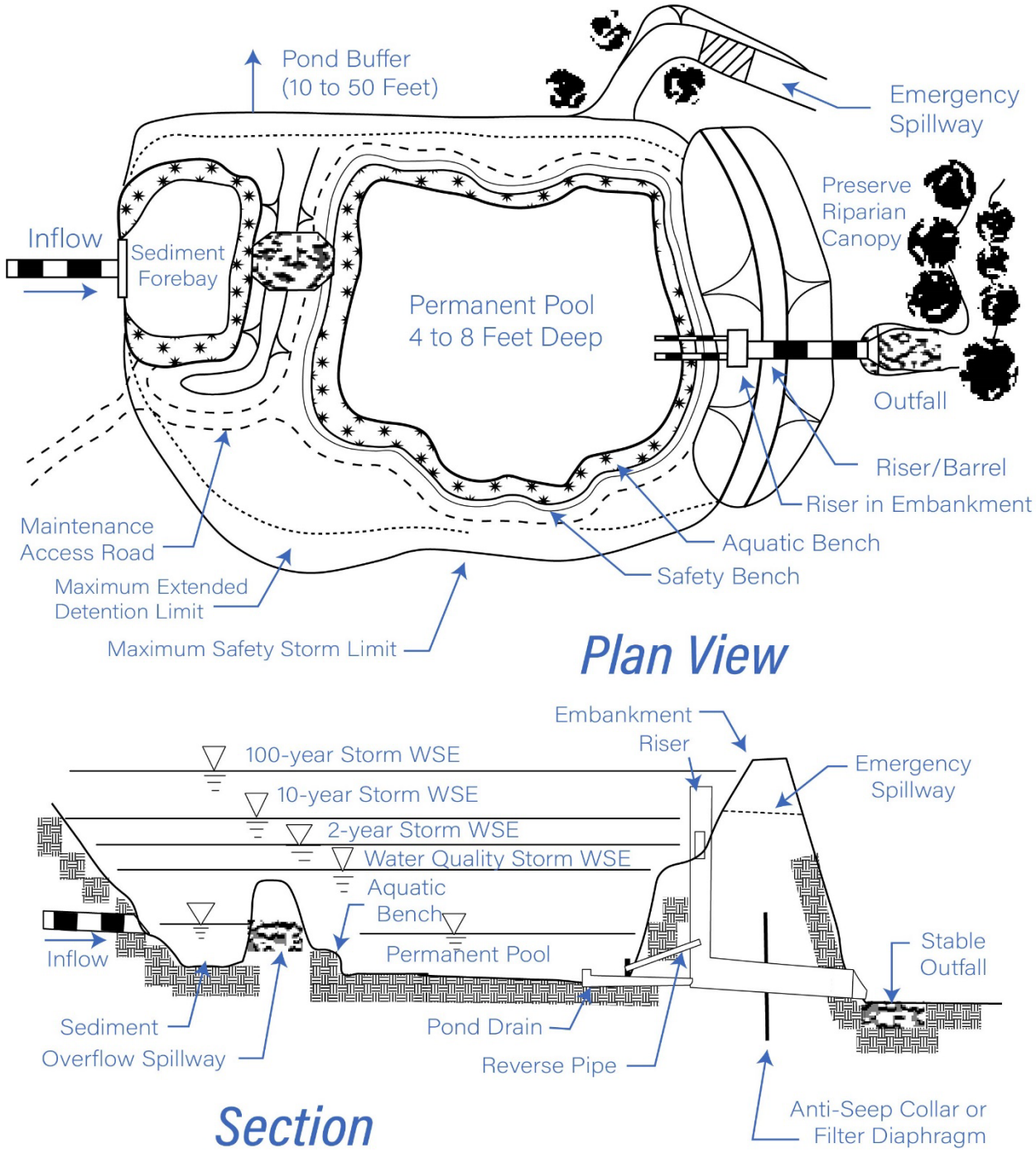
Source: Adapted from NYDEC, 2001.

Figure 13-24. Micropool Extended Detention Pond Schematic



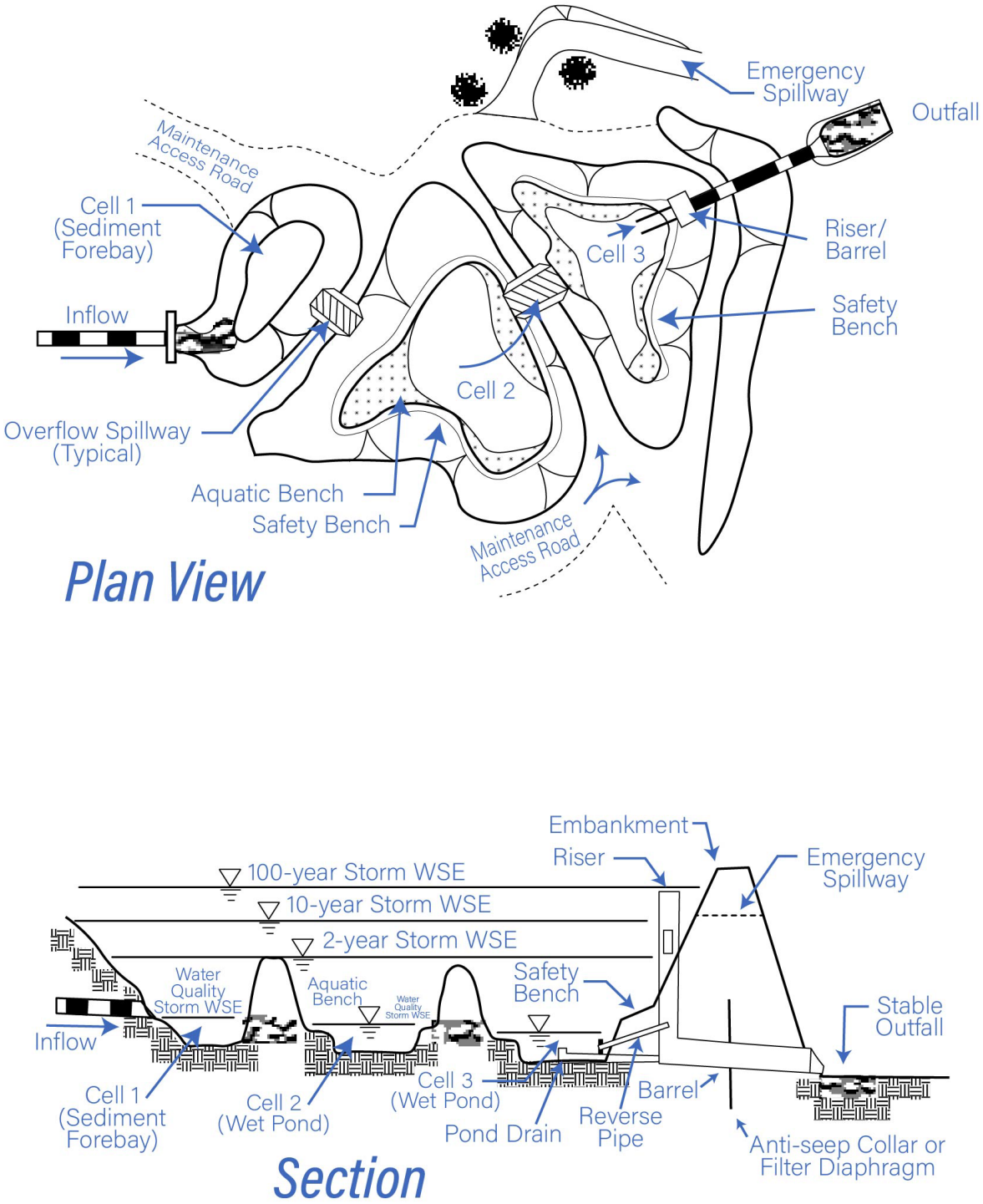
Source: Adapted from NYDEC, 2001.

Figure 13-25. Wet Extended Detention Pond Schematic



Source: Adapted from NYDEC, 2001.

Figure 13-26. Multiple Pond System Schematic



Source: Adapted from NYDEC, 2001.