3.4.1 Dry Detention / Dry ED Basins

Description: A surface storage basin or facility designed to provide water quantity control through detention and/or extended detention of stormwater runoff.

REASONS FOR LIMITED USE

- Controls for stormwater quantity only – not intended to provide water quality treatment

KEY CONSIDERATIONS

- Applicable for drainage areas up to 75 acres
- Typically less costly than stormwater (wet) ponds for equivalent flood storage, as less excavation is required
- Used in conjunction with water quality structural control
- Recreational and other open space opportunities between storm runoff events

STORMWATER MANAGEMENT SUITABILITY

- ☐ **Water Quality**
- ☑ **Channel/Flood Protection**

SPECIAL APPLICATIONS

- ☐ **Pretreatment**
- ☐ **High Density/Ultra-Urban**
- ☐ **Other:**

Residential Subdivision Use: *Yes*

3.4.1.1 General Description

Dry detention and dry extended detention (ED) basins are surface facilities intended to provide for the temporary storage of stormwater runoff to reduce downstream water quantity impacts. These facilities temporarily detain stormwater runoff, releasing the flow over a period of time. They are designed to completely drain following a storm event and are normally dry between rain events.

Dry detention basins are intended to provide overbank flood protection (peak flow reduction of the 25-year storm, Q_{p25}) and can be designed to control the extreme flood (100-year, Q_f) storm event. Dry ED basins provide downstream channel protection through extended detention of the channel protection volume (CP_v), and can also provide Q_{p25} and Q_f control.

Both dry detention and dry ED basins provide limited pollutant removal benefits and are not intended for water quality treatment. Detention-only facilities must be used in a treatment train approach with other structural controls that provide treatment of the WQ_v (see Section 3.1).

Compatible multi-objective use of dry detention facilities in strongly encouraged.

3.4.1.2 Design Criteria and Specifications

Location

- Dry detention and dry ED basins are to be located downstream of other structural stormwater controls providing treatment of the water quality volume (WQ_v). See Section 3.1 for more information on the use of multiple structural controls in a treatment train.

- The maximum contributing drainage area to be served by a single dry detention or dry ED basin is 75 acres.

General Design

- Dry detention basins are sized to temporarily store the volume of runoff required to provide overbank flood (Q_{p25}) protection (i.e., reduce the post-development peak flow of the 25-year storm event to the pre-development rate), and control the 100-year storm (Q_f) if required.

  Dry ED basins are sized to provide extended detention of the channel protection volume over 24 hours and can also provide additional storage volume for normal detention (peak flow reduction) of Q_{p25} and Q_f.

  Routing calculations must be used to demonstrate that the storage volume is adequate. See Section 2.2 (*Storage Design*) for procedures on the design of detention storage.

- Storage volumes greater than 100 acre-feet are subject to the requirements of the Georgia Safe Dams Act (see Appendix H) unless the facility is excavated to this depth.

- Vegetated embankments shall be less than 20 feet in height and shall have side slopes no steeper than 2:1 (horizontal to vertical) although 3:1 is preferred. Riprap-protected embankments shall be no steeper than 2:1. Geotechnical slope stability analysis is recommended for embankments greater than 10 feet in height and is mandatory for embankment slopes steeper than those given above. All embankments must be designed to State of Georgia guidelines for dam safety (see Appendix H).

- The maximum depth of the basin should not exceed 10 feet.

- Areas above the normal high water elevations of the detention facility should be sloped toward the basin to allow drainage and to prevent standing water. Careful finish grading is required to avoid creation of upland surface depressions that may retain runoff. The bottom area of storage facilities should be graded toward the outlet to prevent standing water conditions. A low flow or pilot channel across the facility bottom from the inlet to the outlet (often constructed with riprap) is recommended to convey low flows and prevent standing water conditions.

- Adequate maintenance access must be provided for all dry detention and dry ED basins.

Inlet and Outlet Structures

- Inflow channels are to be stabilized with flared riprap aprons, or the equivalent. A sediment forebay sized to 0.1 inches per impervious acre of contributing drainage should be provided for dry detention and dry ED basins that are in a treatment train with off-line water quality treatment structural controls.

- For a dry detention basin, the outlet structure is sized for Q_{p25} control (based upon hydrologic routing calculations) and can consist of a weir, orifice, outlet pipe, combination outlet, or other acceptable control structure. Small outlets that will be subject to clogging or are difficult to maintain are not acceptable.

  For a dry ED basin, a low flow orifice capable of releasing the channel protection volume over 24 hours must be provided. The channel protection orifice should have a minimum diameter of 3 inches and should be adequately protected from clogging by an acceptable external

trash rack. The orifice diameter may be reduced to 1 inch if internal orifice protection is used (e.g., an overperforated vertical stand pipe with 0.5-inch orifices or slots that are protected by wirecloth and a stone filtering jacket). Adjustable gate valves can also be used to achieve this equivalent diameter.

See Section 2.3 (*Outlet Structures*) for more information on the design of outlet works.

- Seepage control or anti-seep collars should be provided for all outlet pipes.
- Riprap, plunge pools or pads, or other energy dissipators are to be placed at the end of the outlet to prevent scouring and erosion. If the basin discharges to a channel with dry weather flow, care should be taken to minimize tree clearing along the downstream channel, and to reestablish a forested riparian zone in the shortest possible distance. See Section 4.5, *Energy Dissipation Design*, for more guidance.
- An emergency spillway is to be included in the stormwater pond design to safely pass the extreme flood flow. The spillway prevents pond water levels from overtopping the embankment and causing structural damage. The emergency spillway must be designed to State of Georgia guidelines for dam safety (see Appendix H) and must be located so that downstream structures will not be impacted by spillway discharges.
- A minimum of 1 foot of freeboard must be provided, measured from the top of the water surface elevation for the extreme flood, to the lowest point of the dam embankment not counting the emergency spillway.

3.4.1.3 Inspection and Maintenance Requirements

Table 3.4.1-1 Typical Maintenance Activities for Dry Detention / Dry ED Basins
(Source: Denver Urban Storm Drainage Manual, 1999)

Activity	Schedule
• Remove debris from basin surface to minimize outlet clogging and improve aesthetics.	Annually and following significant storm events
• Remove sediment buildup. • Repair and revegetate eroded areas. • Perform structural repairs to inlet and outlets.	As needed based on inspection
• Mow to limit unwanted vegetation.	Routine

3.4.1.4 Example Schematics

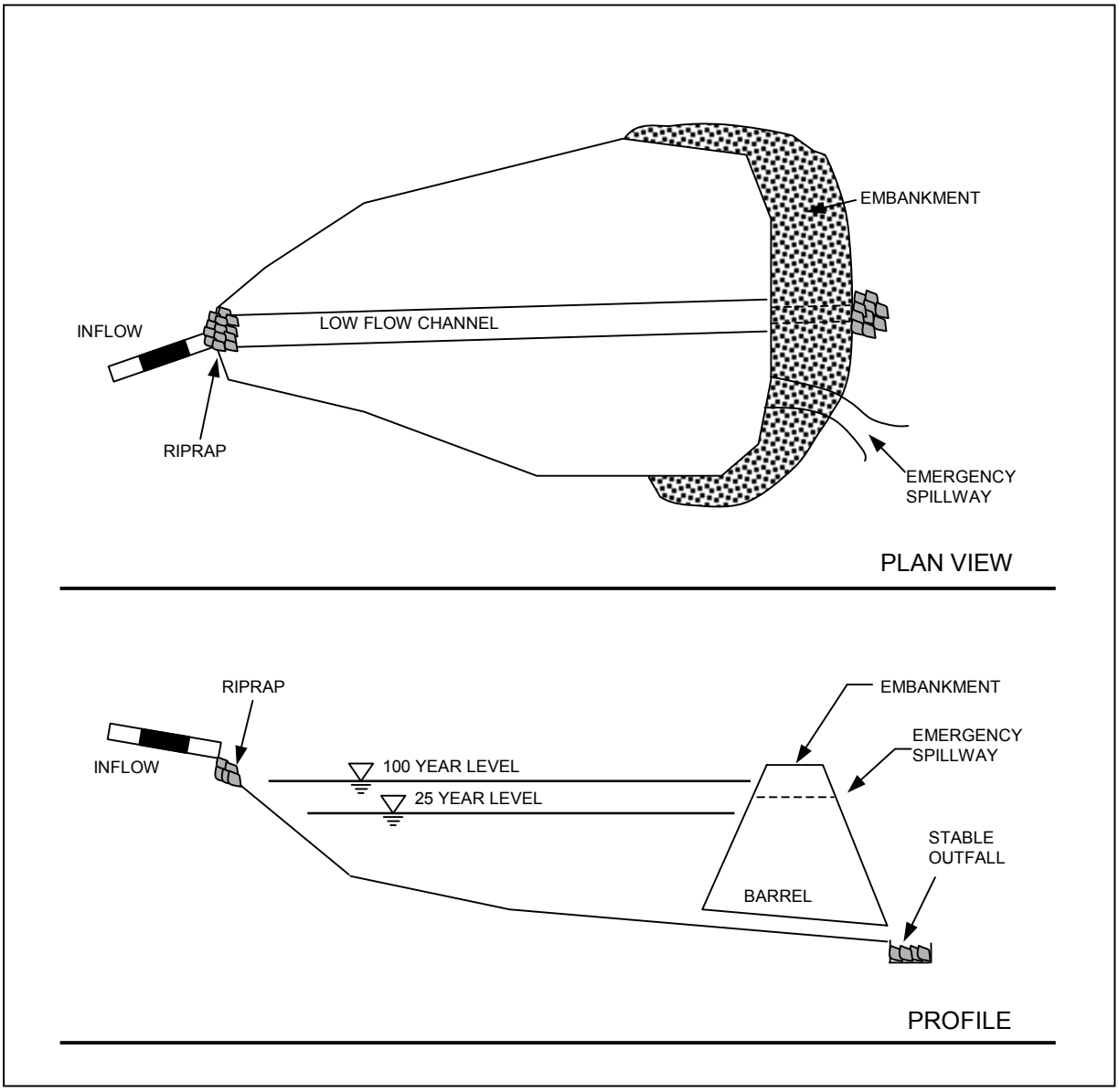

Figure 3.4.1-1 Schematic of Dry Detention Basin

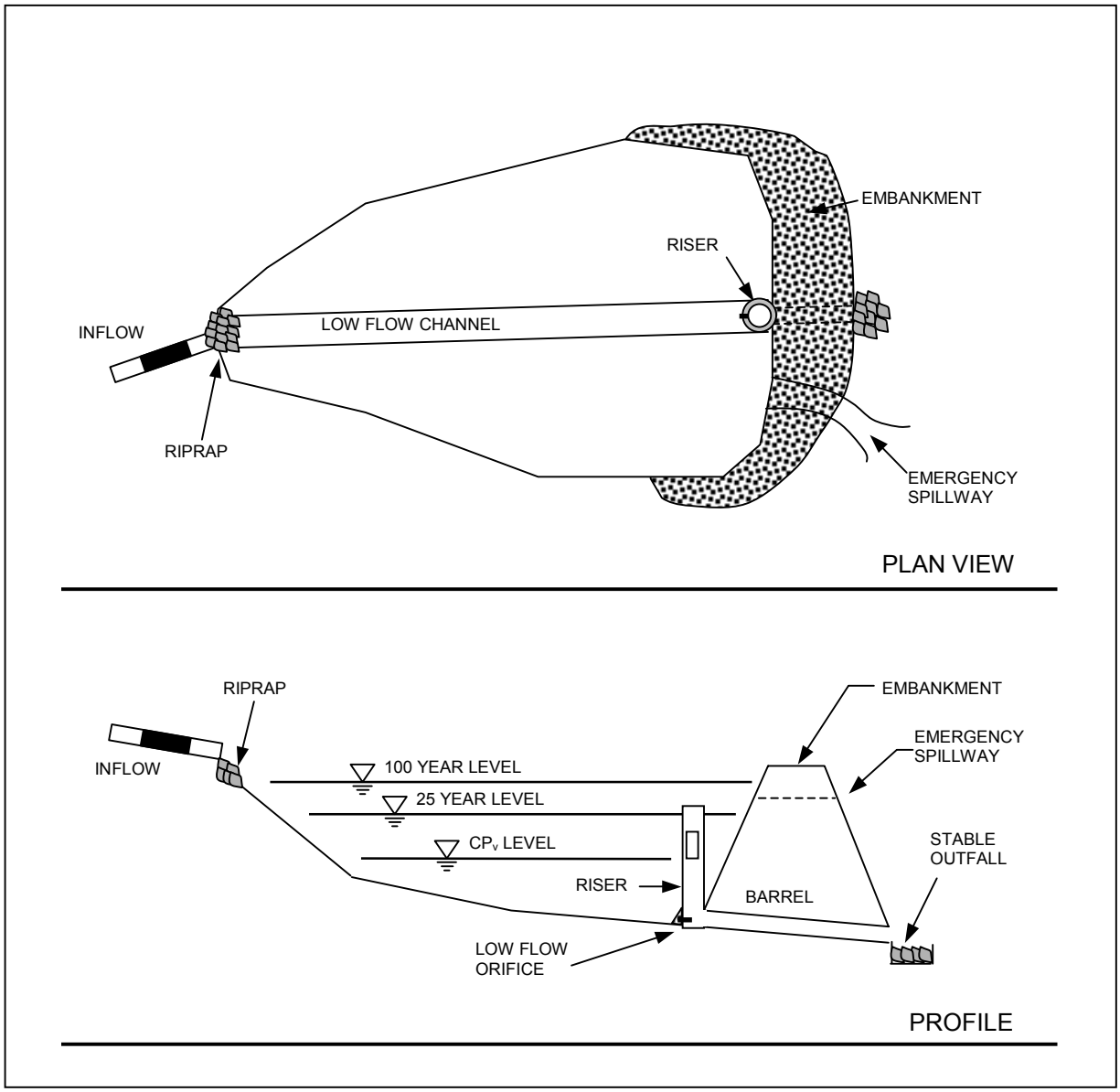

Figure 3.4.1-2 Schematic of Dry Extended Detention Basin

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