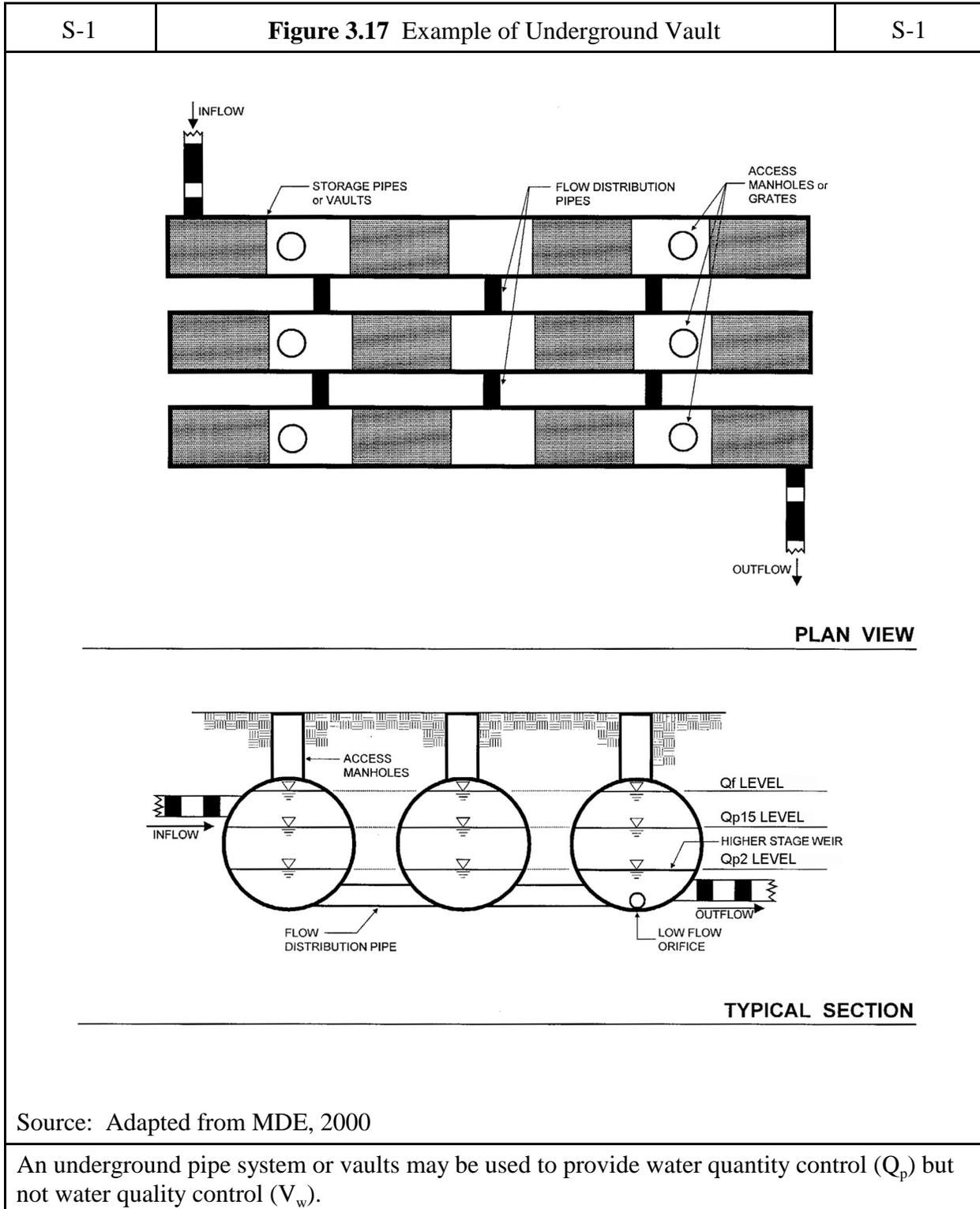


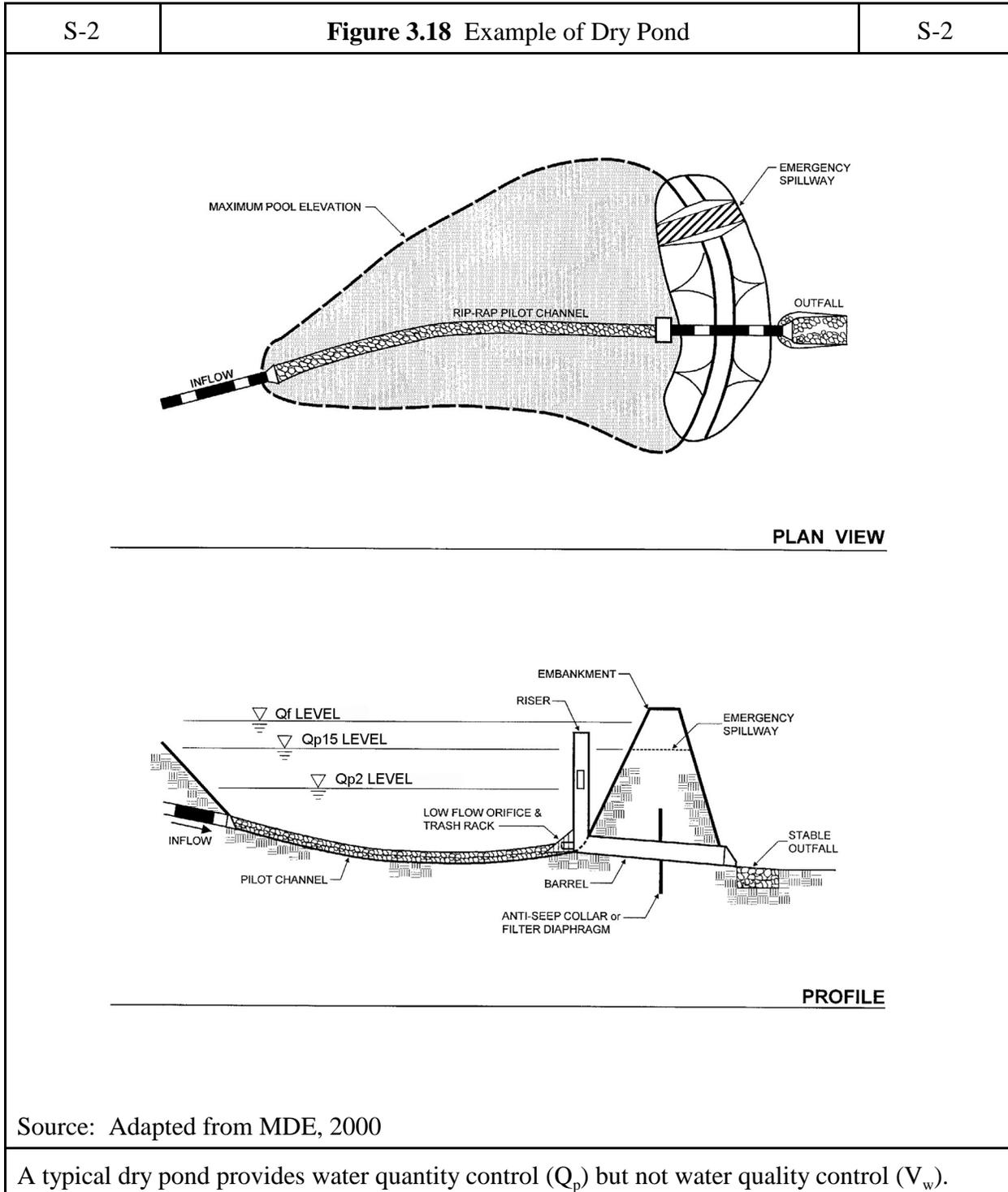
Section 3.3 Storage Practices

Definition: Storage practices are explicitly designed to provide storm water detention (Q_{p2} , Q_{p15} , and / or Q_f). Design variants include:

- S-1 underground vault
- S-2 dry pond

Storage practices are not considered an acceptable practice to meet the water quality volume requirement (V_w). Storage practices must generally be combined with a separate facility to meet these requirements.





3.3.1 Storage Feasibility Criteria

For a dry pond system, no utility lines shall be permitted to cross any part of the embankment where the design water depth is greater than 2 feet.

All utilities must have a minimum 5' horizontal clearance from the facility.

Delineate the drainage area to show the downstream storm sewer system, surface water body, or water course and the extent of the underground facility.

A geotechnical report is required for all underground BMPs, including storage practices. Geotechnical testing requirements are outlined in Appendix E.

3.3.2 Storage Conveyance Criteria

The Department may require the use of the Natural Resources Conservation Service storage indication method or an equivalent acceptable method to route the design storms through the detention structure.

To prevent scouring of the pond bottom, stone pilot channels are required in all dry ponds. In no case shall a pond have a bottom slope less than 1% in the pilot channel and a 0.5% slope towards the outlet or pilot.

Velocity dissipation devices shall be placed at the outfall of all detention structures and along the length of any outfall channel as necessary to provide a non-erosive velocity of flow from the structure to a water course. An outfall analysis shall be included in the storm water management plan showing discharge velocities down to the nearest downstream water course. Where indicated, the developer / contractor must secure an off-site drainage easement for any improvements to the downstream channel.

Dry ponds shall have an earthen emergency spillway cut in natural ground unless waived by the Department. Emergency spillways cut in fill must be lined with filter cloth beneath PVC-coated gabion baskets.

The final release rate of the facility shall be modified if any increase in flooding or stream channel erosion would result at a downstream structure, highway, or natural point of restricted streamflow (see section 2.4 Additional Storm Water Management Requirements).

Show 100-year ponding and/or safe overflow pathways.

3.3.3 Storage Treatment Criteria

Provide structural details of the underground detention system.

Provide profile of entire system with inverts, pipe size, pipe type, slopes, and hydraulic grade line (HGL) through the facility.

Provide cross section(s) and plan view.

Water tight joints shall be provided at all pipe connections.

Underground detention structures shall be composed of reinforced concrete. Other materials may be used for storm water management detention when the Department has approved their application.

All structural information for non-standard structures or modified structures along with H-20 loading information must be provided for approvals.

Anti-flotation analysis is required to check for buoyancy problems in the high water table areas.

Anchors shall be designed to counter the pipe and structure buoyancy by at least a 1.2 factor of safety.

3.3.4 Storage Maintenance Criteria

All storage practices shall be designed so as to be accessible to annual maintenance.

Unless waived by the Department, a 5:1 slope and 15 foot wide entrance ramp is required for maintenance access to dry ponds

Trash racks shall be provided for low-flow pipes and for risers not having anti-vortex devices.

