M-5. Dry Wells

A dry well is an excavated pit or structural chamber filled with gravel or stone that provides temporary storage of stormwater runoff from rooftops. The storage area may be constructed as a shallow trench or a deep well. Rooftop runoff is directed to these storage areas and infiltrates into the surrounding soils prior to the next storm event. The pollutant removal capability of dry wells is directly proportional to the amount of runoff that is stored and allowed to infiltrate.

Applications:

Dry wells can be used in both residential and commercial sites and are best suited for treating runoff from small drainage areas such as a single rooftop or downspout. Dry wells are not appropriate for treating runoff from large impervious areas such as a parking lot. Successful application is dependent upon soil type and groundwater elevation.

Performance:

When designed according to the guidance provided below, dry wells will provide treatment for the required ESD_v and Re_v.

Constraints:

The following constraints are critical when considering the use of dry wells to capture and infiltrate stormwater runoff:

- **Space:** Dry wells should not be used in areas where their operation may create a risk for basement flooding, interfere with subsurface sewage disposal systems, or affect other underground structures. There are limited opportunities for dry well implementation in high-density neighborhoods.

- **Topography:** Steep terrain affects the successful performance of a dry well. Installation on slopes greater than 20% should be avoided.

- **Soils:** Permeable soils are critical to the successful application of dry wells. The HSG should be A or B. For HSG C or D or compacted soils, designers should consider using practices with underdrains like micro-bioretention.

- **Drainage Area**: Small drainage areas (e.g., 500 ft^2) are most appropriate for dry well applications. Larger non-residential areas may be treated provided the dry well is sized according to the requirements for infiltration practices found in Section 3.3.

- **Hotspot Runoff:** Dry wells should not be used to treat hotspots that generate higher concentrations of hydrocarbons, trace metals, or toxicants than are found in typical stormwater runoff and may contaminate groundwater.

- **Operation:** Dry wells are subject to neglect by homeowners. Education is needed to ensure that proper maintenance will allow the system to continue to function properly.

Design Guidance:

The following conditions should be considered when designing dry wells:

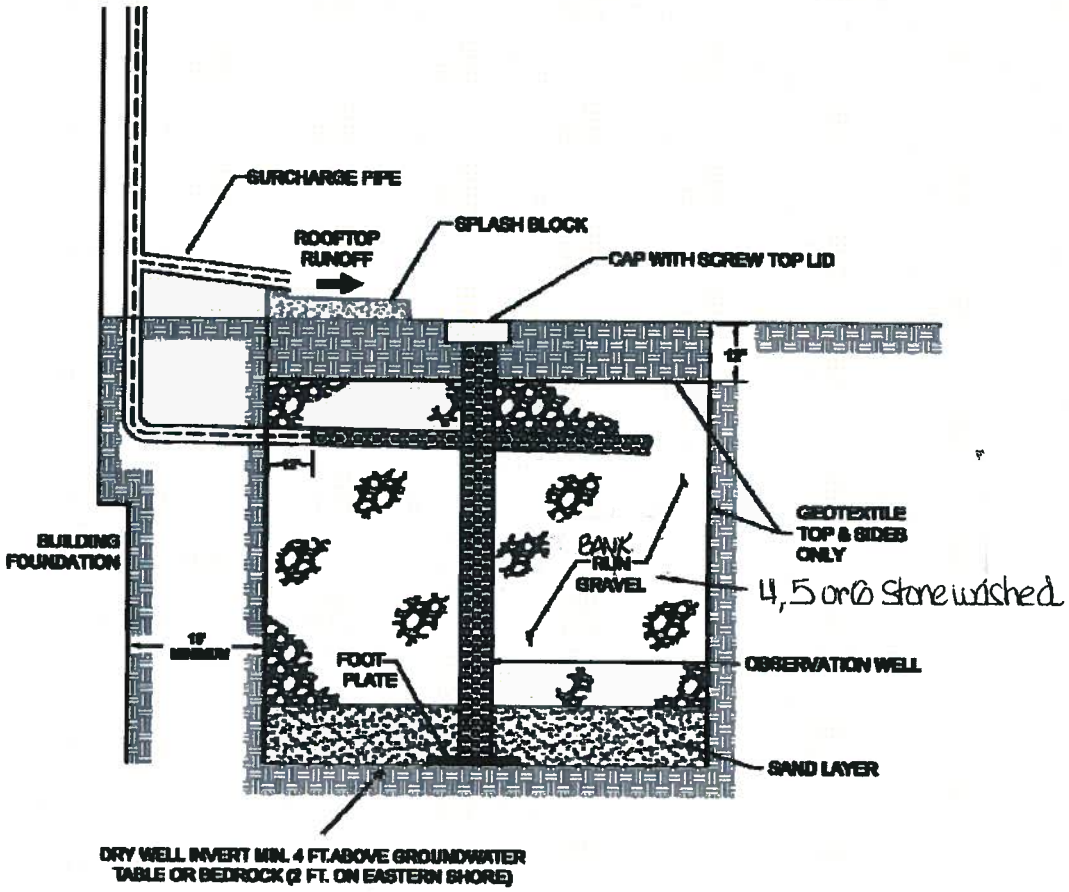
- **Conveyance:** *Discharge from the overflow shall be directed to an above ground splash pad and conveyed in a non-erosive manner to a stable outfall.* Rooftop runoff is collected through gutters and downspouts and discharged directly into a dry well. The downspout extends underground and across the entire length of a dry well. An overflow pipe is also installed to pass excess runoff generated from larger storms.

- **Treatment:** Dry wells shall meet the following conditions:

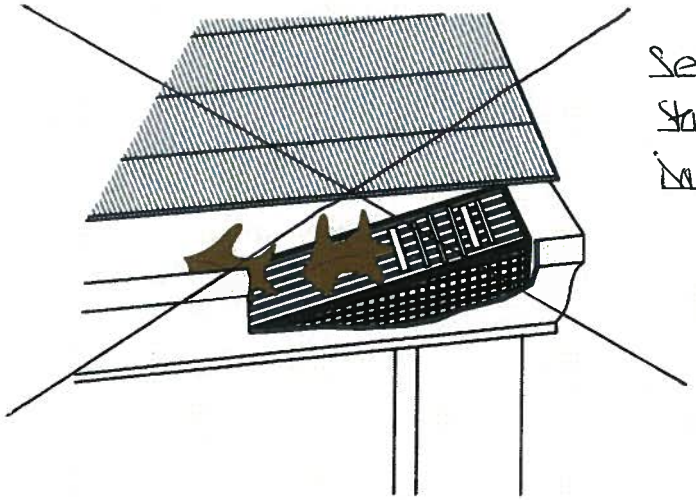
  - *Pretreatment measures shall be installed to allow filtering of sediment, leaves, or other debris.* This may be done by providing gutter screens and a removable filter screen installed within the downspout pipe or other locally-approved method. The removable filter screen should be installed below the overflow outlet and easily removed so that homeowners can clean the filter.
  - *A dry well shall be designed to capture and store the ESD_v. A P_E value based on the ESD_v captured and treated shall be applied to the contributing drainage area.* The storage area for the ESD_v includes the sand and gravel layers in the bottom of the facility. Storage calculations shall account for the porosity of the gravel and sand media.
  - *The drainage area to each dry well shall not exceed 1,000 square feet.* Drainage areas should be small enough to allow infiltration into the ground within 48 hours (e.g., 500 ft^2 to each downspout). Infiltration trenches may be used to treat runoff from larger drainage areas (see Section 3.3).
  - *Dry wells located in HSG B (i.e., loams, silt loams) shall not exceed 5 feet in depth. Dry wells located in HSG A (i.e., sand, loamy sand, sandy loam) shall not exceed 12 feet in depth.*
  - The length of a dry well should be longer than the width to ensure proper water distribution and maximize infiltration.
  - *A one-foot layer of clean sand shall be provided in the bottom of a dry well to allow for bridging between the existing soils and trench gravel.*

- **Soils:** *Dry wells shall be installed in HSG A or B. The depth from the bottom of a dry well to the seasonal high water table, bedrock, hard pan, or other confining layer shall be greater than or equal to four feet (two feet on the lower Eastern Shore).*

Figure 5.13 Dry Well



Section



See Standard Drywell Downspout Fittings

Gutter Drain Filter (Typical)

- **Setbacks:**
  - *Dry wells shall be located down gradient of building structures and shall be setback at least 10 feet from buildings, 50 feet from confined water supply wells, 100 feet from unconfined water supply wells, and 25 feet from septic systems.*
  - *Dry wells shall be setback a minimum of 100 feet from fill slopes of 15% and 200 feet from fill slopes of 25%.*

- **Observation Wells:** *An observation well consisting of an anchored, 4 to 6-inch diameter perforated pipe shall be required. The top of the observation well shall be at least six inches above grade.*

- **Underground Distribution Pipe:** This pipe (4 to 6 inch diameter) will be perforated to fill the trench along its entire length.

- **Landscaping:** *A minimum one-foot of soil cover shall be provided from the top of the trench to the ground surface elevation.* The soil should be stabilized with a dense cover of vegetation. In areas where frost heave is a concern, soil cover may need to be as much as four feet. In these cases, a geotechnical engineer should be consulted.

Construction Criteria:

The following items should be addressed during construction of projects with dry wells:

- **Erosion and Sediment Control:** Final grading for proposed dry wells should not take place until the surrounding site is completely stabilized. *If this cannot be accomplished, runoff from disturbed areas shall be diverted.*

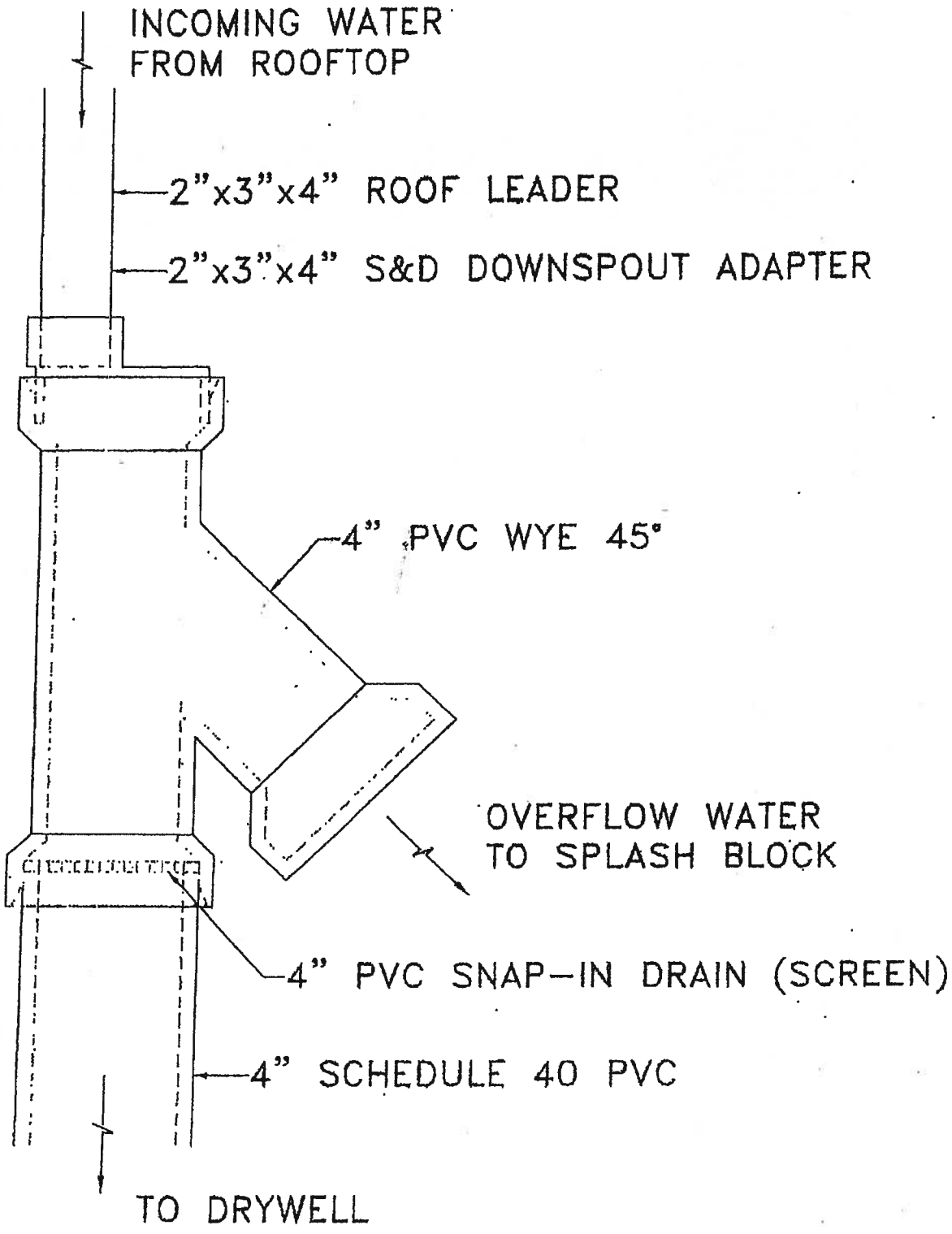
- **Soil Compaction:** *Excavation should be conducted in dry conditions with equipment located outside of the practice to minimize bottom and sidewall compaction. Construction of a dry well shall be performed with lightweight, wide-tracked equipment to minimize disturbance and compaction. Excavated materials shall be placed in a contained area.*

- **Underground Chamber:** A subsurface prefabricated chamber may be used.

- **Dry Well Bottom:** *The bottom shall be as level as possible to minimize pooled water in small areas that may reduce overall infiltration and longevity.*

- **Filter Cloth:** *Filter cloth shall not be installed on the bottom of the well.* Non-woven filter cloth should be used to line the top and sides of the dry well to prevent the pore space between the stones from being blocked by the surrounding native material.

- **Gravel Media:** *The aggregate shall be composed of an 18 to 48-inch layer of clean washed, open graded material with 40% porosity* (e.g., ASTM D448 4,5, or 6 stone or equal).



STANDARD DRYWELL DOWNSPOUT FITTINGS

SCALE: NOT TO SCALE