A dry swale can be thought of as an enhanced grass swale that incorporates an engineered filter bed and an optional impermeable liner and underdrain in a trapezoidal cross-section as long as the engineered soil (filter media) bed boundaries lay in the flat bottom areas. Swale length between culverts should be 5 metres or more. The bottom width should be between 1.75 m and 2.0 m, and greater widths are desired. Vegetation or aggregate material on the surface of the swale slows the runoff water to allow sedimentation. Invasion through the root zone and engineered soil bed, evapotranspiration, and infiltration into the underdrain may occur.

**GENERAL DESCRIPTION**

- **SHAPE**: A parabolic shape is preferable for aesthetic maintenance and hydraulic performance.
- **SLOPE**: Open channel trapezoidal cross-section as long as the engineered soil (filter media) bed boundaries lay in the flat bottom areas.
- **WIDTH**: For the trapezoidal cross section, the bottom width should be between 1.75 m and 2.0 m, and greater widths are desired. Vegetation or aggregate material on the surface of the swale slows the runoff water to allow sedimentation. Invasion through the root zone and engineered soil bed, evapotranspiration, and infiltration into the underdrain may occur.
- **SIDE WALLS**: Should be no steeper than 3:1 for maintenance considerations (rowing). Flapper stoppers are encouraged where adequate space is available to provide protection for the swale from concentrated exfiltration. Specification designs should be used.
- **LONGITUDINAL SLOPE**: Should be as gradual as possible to permit the temporary ponding of water within the swale and allow stormwater to exit the system. It is recommended that the swale be designed with longitudinal slopes generally ranging from 0.5 to 4%, and no greater than 6%. On slopes steeper than 3%, check dams should be used. Check dams should be spaced far enough apart to allow for access for maintenance equipment.

**PRE-TREATMENT**

- **Pretreatment stoppers**: Preset during digging by capturing coarse sediments before they reach the filter bed. Where runoff source areas produce little sediment, such as roofs, dry swales can function effectively without pretreatment. To treat parking areas or road runoff, two deep swales should be considered. Inlet and outlet protection may also be recommended. PRETREATMENT practices that may be feasible, depending on conveyance method and availability of sources.
- **SEDIMENTATION FORBAY (TWO-CELL DESIGN)**: Foray ponding volume should account for 25% of the water quality storage requirement and be designed to be a 2:1 (height to width) ratio. Two deep swales may be necessary for large drainage areas.
- **VEGETATED FILTER STRIP (SHEET FLOW)**: A filter strip, if designed, should be a minimum of 3 m in width. The filter strip should consist of a 10 cm granular base layer and a top layer of non-woven geotextile fabric to prevent clogging.
- **GRAVEL CHOKING LAYER**: A 100 mm deep layer of pea gravel (3 to 10 mm diameter) perforated HDPE or equivalent material, minimizes erosion due to the removal of coarse sediments. The gravel should be permanently installed in the swale.
- **MATERIALS**: Material should be selected based on the intended use of the filter bed. Materials may include pea gravel or permeable Vinylex (material resistance to clogging).
- **DESIGN GUIDANCE**

**ABILITY TO MEET SWOM OBJECTIVES**

- **BMP**: Dry swale with no underdrain or full infiltration
- **Water Balance Improvement**: Yes - site for water quality storage requirement
- **Stream Channel Erosion Control**: Partial - based on available storage volume and soil infiltration rate

**SPECIFIC GENERAL FOREST BALL-RETENTION**

- **Filter Media Composition**: Filter Media Soil Mixture to contain: 85% to 88% sand; 4% to 8% silt fines; 3% to 5% organic matter
- **Quantity**: Volumetric combination based from permeable filter bed and depth used in washout computations.

**GENERAL SPECIFICATIONS**

- **Material**: Filter Media Soil Mixture to contain: 85% to 88% sand; 4% to 8% silt fines; 3% to 5% organic matter
- **Specification**: Volumetric combination based from permeable filter bed and depth used in washout computations.

**OPERATION AND MAINTENANCE**

Dry swales require routine inspection and maintenance of the landscape as well as periodic inspection for less frequent maintenance needs or remedial maintenance. Generally, routine maintenance will be the same as for any other landscaped area, weeding, pruning, and filter removal. Regular watering may be required during the first two years until vegetation is established.

For the first two years following construction the facility should be inspected at least quarterly and after every major storm event (> 25 mm). Subsequently, inspections should be conducted in the spring and fall of each year and after major storm events. Inspect the vegetation density (at least 80% coverage), damage by foot or vehicular traffic, vegetation invasion, accumulation of debris, trash, and sediment, and structural damage to pretreatment devices. Trash and debris should be removed from pretreatment devices, the dry swale surface and inlet and outlets at least twice annually. Other maintenance activities include repinning mulch, pruning, weeding replacing dead vegetation and removing eroded areas as needed. Remove accumulated sediment on the dry swale surface when dry and exceeding 25 mm deep.

**CONVEYANCE AND OVERFLOW**

- **DESIGN GUIDANCE**: Should be designed for a maximum velocity of 0.5 m/s or less for a 4-hour 25 mm Chicago storm event. The swale should also convey the locally required design flow rate.
- **CONSTRUCTION CONSIDERATIONS**: Ideally, dry swale sites should remain outside of floodplains. The inclusion of the swale begins to prevent soil erosion of the open area. The swale should never be used as the site of sediment basins to prevent erosion. Infiltration of the swale may be varied away from the practice until the drainage area is fully saturated.

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