

4.3-h A/C SWALE

Alternative Names: Paved Swale, Permanent Waterway, Drainage Way



Concrete swale on a commercial site conveys stormwater to a drain inlet.

DESCRIPTION

An A/C swale is a man-made drainage channel designed, shaped, and lined to convey surface runoff in a non-erosive manner downstream to a treatment and/or infiltration system. A/C swales convert sheet flow and pipe flow to channel flow in order to transport water.

An A/C swale has no water quality benefit alone; however, in a developed watershed it is often a required component of a drainage system that as a whole has a water quality benefit.

APPLICABILITY

- Applicable in all drainage systems which collect, concentrate, and convey stormwater at the ground surface. They can be used to convey runoff both to and from underground storm drain systems.
- Applicable for runoff collection on driveways and parking lots with a 5 percent slope or less.
- Applicable along roadsides where infiltration is not desired and maintenance is a concern due to abrasives applied during the winter.

Advantages

- May be less expensive to install than other conveyance measures.
- Easier to maintain than other conveyance systems.
- Prevents the discharge of stormwater runoff from the site.

BMP DESIGN APPROACH

- Pollutant Source Control
- Hydrologic Source Control
- Stormwater Treatment

SCALE OF APPLICATION

- All SFR and MFR < 1 acre
- MFR 1-5 Acre and CICU < 5 acres
- MFR and CICU > 5 acres and all WQIPs

TYPE OF APPLICATION

- Temporary
- Permanent

Disadvantages

- Not effective for collection of runoff from slopes greater than 5 percent. Stormwater runoff on slopes steeper than 5 percent have an increased velocity and tend to flow over an A/C swale.
- Converts sheet flow to channel flow, which increases flow velocities and erosive energy.
- Paved swales do not infiltrate stormwater.
- Concentrates the volume of runoff.

DESIGN CONSIDERATIONS

- The A/C swale must have sufficient capacity to convey a 10-yr/24-hr storm and be resistant to erosion during the peak flow.
- Determine the capacity of the A/C swale and the velocity of flow from the type of channel lining, cross-sectional area and shape, and the slope of the channel.

INSTALLATION CONSIDERATIONS

- Place collection and conveyance swales on driveways and other paved areas close to the property line, to collect and convey as much water on-site as possible.
- For new construction, install paved swales as driveways/parking lots are installed, since retrofitting a swale requires cutting into existing pavement.
- To be effective, use greater angles for steeper surfaces. Install a slotted channel drain instead of an A/C swale in areas where the slope of the contributing surface is greater than 5 percent.
- Install paved swales on driveways, along roadsides, and on steep or unstable slopes where infiltration can destabilize the slope. Use paved swales along roadsides where ease of cleaning and maintaining is important. Otherwise, consider installing a rock or vegetated swale given the added benefits of infiltration and filtration they can provide.
- Use qualified professionals to design and install permanent swales.

INSPECTION AND MAINTENANCE

The inspection crew should pour water on the impervious surface above the A/C swale or observe the swale during a storm event to verify the swale is capturing and conveying runoff from the impervious surface to the treatment/infiltration system. Inspection crews should document sediment and debris accumulation, contributing sediment sources, blockages of stormwater flow, and structural damage and ensure that action is taken to maintain effective performance.

Inspect the structural integrity of A/C swales to ensure that plow damage, tree root heaving, or deterioration has not compromised their function. The most crucial A/C swale maintenance need is to ensure unobstructed flow by routinely removing accumulated sediment and debris. This is most efficiently accomplished with routine sweeping to remove sediment and debris.

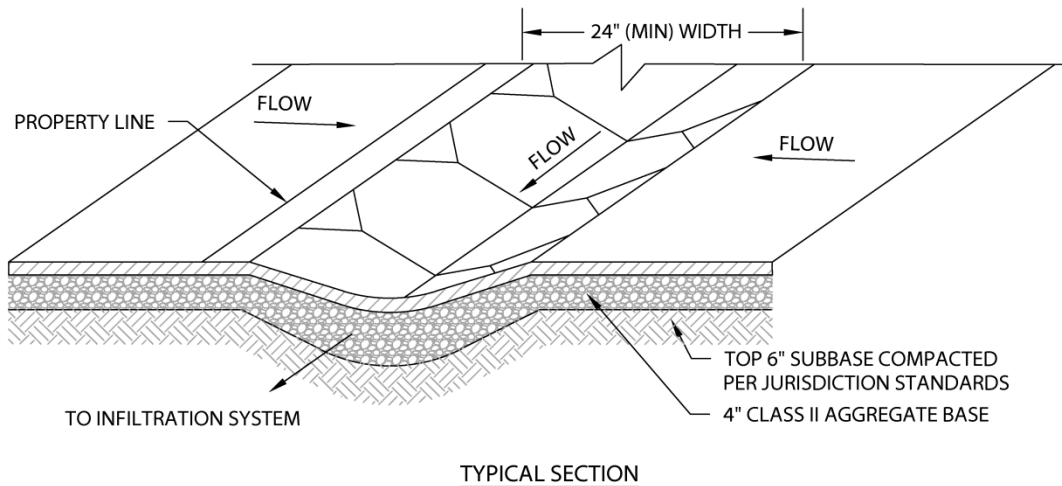
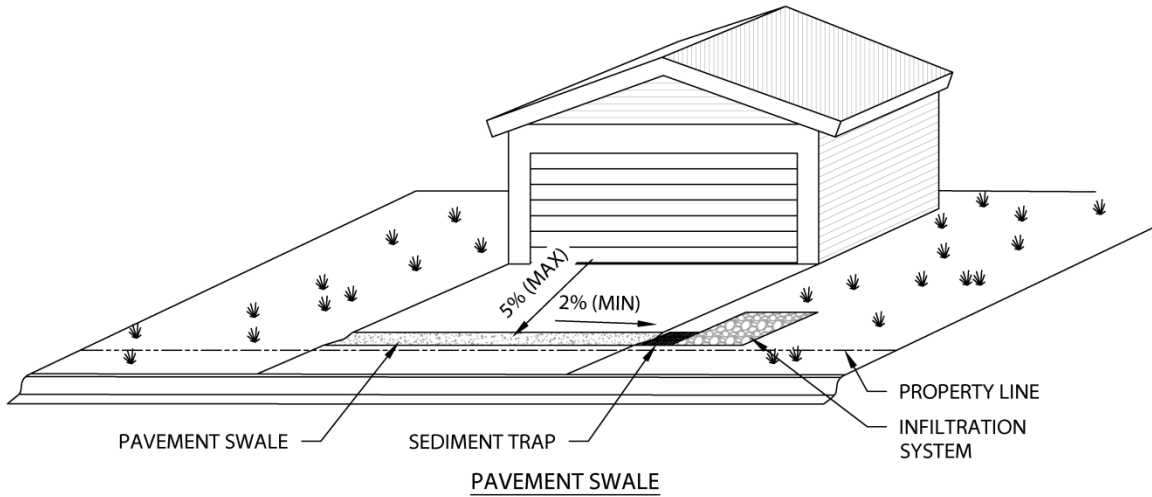
EFFECTIVENESS CONSIDERATIONS

Paved swales are effective in conveying stormwater runoff if properly designed and installed as part of a drainage system.

A/C Swale Inspection and Maintenance Table

INSPECTION AND MAINTENANCE ACTIVITIES	SUGGESTED FREQUENCY	INSPECTION EQUIPMENT	MAINTENANCE EQUIPMENT
<p>Inspect that the swale is capturing runoff from the impervious surface and conveying it to the treatment/infiltration system. The inspection crews should pour water (using a hose or large water container) on the surface or observe during storm event to verify performance.</p> <ul style="list-style-type: none"> Repair any blocked or diverted conveyance sections. 	Annually in spring	Water Source	Tools as needed to repair
<p>Inspect for accumulated sediment, debris, and litter such as pine needles which can form dams and divert flows out of A/C swales.</p> <ul style="list-style-type: none"> Remove accumulated sediment, debris, and litter. Dispose of sediment at a TRPA approved stable on-site location or out of the Lake Tahoe Region. Do not use an air blower to perform this work. 	Twice annually in spring and fall and after major storms		Streetsweeper, Broom, Flat shovel, Trash bag
<p>Inspect for swale structural integrity. This is best performed after cleaning the swale of debris. Look for wear to the swale caused by vehicle loading, snowplows, tree root heaving, cracking, and other damage.</p> <ul style="list-style-type: none"> Repair or replace structurally suspect or deteriorated A/C swale sections. 	Annually after cleaning		Tools as needed to repair or replace
<p>Inspect for any upslope contributing sediment sources to reduce the accumulation of sediment in the A/C swale.</p> <ul style="list-style-type: none"> Stabilize eroding slopes and bare soil areas to prevent sediment entry into swale. Routinely sweep the street/driveway to remove sediment before it enters swale. 	Annually in spring and before major storms		Soil amendment, Seeds/Plants, Irrigation, Mulch, Erosion Control Blanket System, Broom, Streetsweeper
<p>Monitor ongoing effectiveness and determine whether another BMP type or additional BMPs could improve long-term effectiveness and improve benefits to costs versus the existing A/C swale.</p> <ul style="list-style-type: none"> Analyze Inspection and Maintenance Log for trends and recurring issues. Prepare a plan that more effectively addresses conveyance needs, reduces long term maintenance costs, and improves overall effectiveness and safety of the BMP. 	Every 5 years	Qualified Inspector or Consultant	Qualified Inspector or Consultant

Pavement Swale Figure



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