

Water Quality

Dry Detention Pond



Description:

A shallow depression designed to treat a specific volume of runoff. The stormwater runoff is temporarily stored in the pond and drawn down over a period of time (minimum drain time is 40 hours) through an outlet structure or spillway.

Pros

- Efficient pollutant removal for good range of suspended solids and heavy metals.

Cons

- Requires a large amount of land to configure the pond geometry correctly.
- May become an eyesore, and standing water may be present sometimes.
- May require fencing around the perimeter.
- Must be located near project stormwater outfalls.

Constructed Wetlands



Description:

Artificial wetlands constructed to simulate natural biological and chemical processes to treat runoff.

Pros

- Efficient filters for suspended solids, heavy metals, and organic matter, and are effective transformers of nitrogen.

Cons

- Requires a constant base flow of water.
- Pollutant removal efficiencies vary significantly depending on site design and conditions.
- Requires large, shallow, flat locations.
- Sediment pond or forebay is required.
- Requires monthly maintenance until vegetation is established. Inspection and nuisance species removal must be performed annually.
- May take longer than one season to establish vegetation
- May require fencing around the perimeter.
- Must be located near project stormwater outfalls.

Vegetated Swales



Description:

Open channel drainageway with grass or other vegetation to provide conveyance and to filter pollutants.

Pros

- Enhance stormwater quality and reduce peak runoff.
- Swales without an underdrain system have shown water quality benefits and are endorsed by FHWA for urban applications.

Cons

- Design flows may limit effectiveness.
- Dry swales with an underdrain system are susceptible to clogging.
- Requires the establishment of vegetation; temporary irrigation may be required, and CDOT does not typically irrigate.

Catch Basin Inserts



Description:

Hang from the opening of a curb inlet or below the grate of an inlet. Designed to capture sediment and other debris.

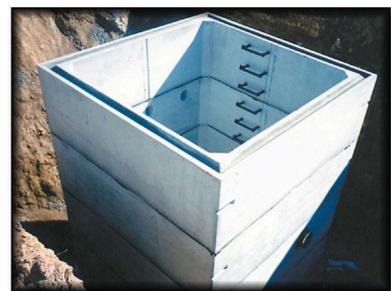
Pros

- Best suited as a pretreatment for sediment and debris removal before flows are conveyed to downstream flows.

Cons

- Frequent maintenance of inserts (every two to three major storms) may not be possible.

Subsurface Sand Filter



Description:

Underground concrete vault designed with distinct chambers designed for various levels of treatment. Layers of sand are used to filter stormwater runoff.

Pros

- Useful in space-limited areas.
- Most effective in treating runoff from small storms or early stages of larger storms.
- Less effect to surface land use.

Cons

- Subject to clogging if moderate to high levels of silts and clays flow into facility.
- Cannot be used while construction is in progress.
- Further evaluation would be necessary to consider for space limited locations in Colorado.

Underground Systems



Description:

Premanufactured stormwater treatment devices designed to be installed underground. Use vortex-motion, particulate setting, and/or filtration treatment mechanisms.

Pros

- Useful in space-limited areas.
- Internal bypass system built in (no pretreatment required).
- Can be used in a treatment train with other systems.
- Less visual impact to existing corridor.
- Less effect to surface land use.

Cons

- Can not treat large drainage areas.
- Require a vacuum truck to remove accumulated sediment.
- Frequent maintenance and/ or replacement of filters may be needed.
- Limited long-term monitoring data. More monitoring and performance data may need to be considered to determine suitability for CDOT projects.