Stormwater Operations and Maintenance Guide

Receiving Pervious Areas (Grass Buffers and Grass Swales)

Introduction

Receiving pervious areas (RPAs) reduce the volume of runoff through infiltration and wetting of soils/media with subsequent evapotranspiration. RPAs include grass buffers, grass swales and other small landscaped areas receiving runoff from roof or hardscape areas that promote infiltration of runoff and are wetted in the water quality design event. Grass buffers are densely vegetated strips of grass designed to accept sheet flow from upgradient developed areas. Grass swales have dense vegetation and broad cross-sections that convey concentrated flow in a slow and shallow manner, facilitating infiltration, sedimentation, and filtering (straining) while limiting erosion.

RPA Components

Receiving Pervious Areas have several components that each serve a special function and have different inspection and maintenance needs. RPA components include:

Inflow point (inlets)

The inflow point is where runoff enters the system through a storm sewer pipe, roof downspout, surface channel, curb-cut or as “distributed” surface overflow. Inflow points should have a vertical drop to allow positive drainage into the feature.

Forebays/ Energy Dissipation

The forebay is located below the inflow point and is designed to remove large particles, trash and other debris as well as provide Energy Dissipation. Some features do not include a Forebay and instead have only Energy Dissipation features such as rip rap, curb cuts, etc.

Vegetated Area

The vegetated area receives run-on and is of at least 80% vegetated density. The vegetated area may include Check Dams to decrease speed of flows.

Underdrain

Underdrains are only used in grass swales with very shallow slopes and only when the underlying soil will not allow flows to quickly bypass the swale through the underdrain.

Engineering details are only a representation of feature design and may not officially be accepted as City of Thornton standard details.

	MAX. SLOPE	MIN. SLOPE
IRRIGATED BLUEGRASS SOD	25%	2%
IRRIGATED TURF FORMING NATIVE GRASS	10%	2%

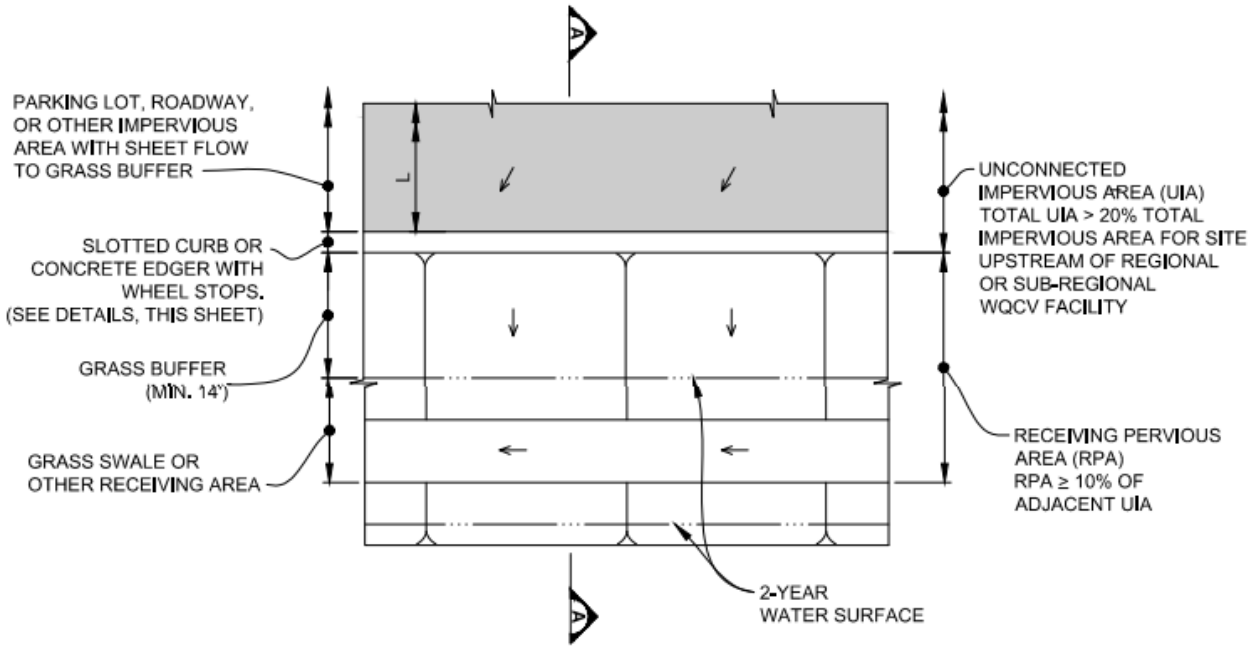

Figure: grass Buffer Design Criteria

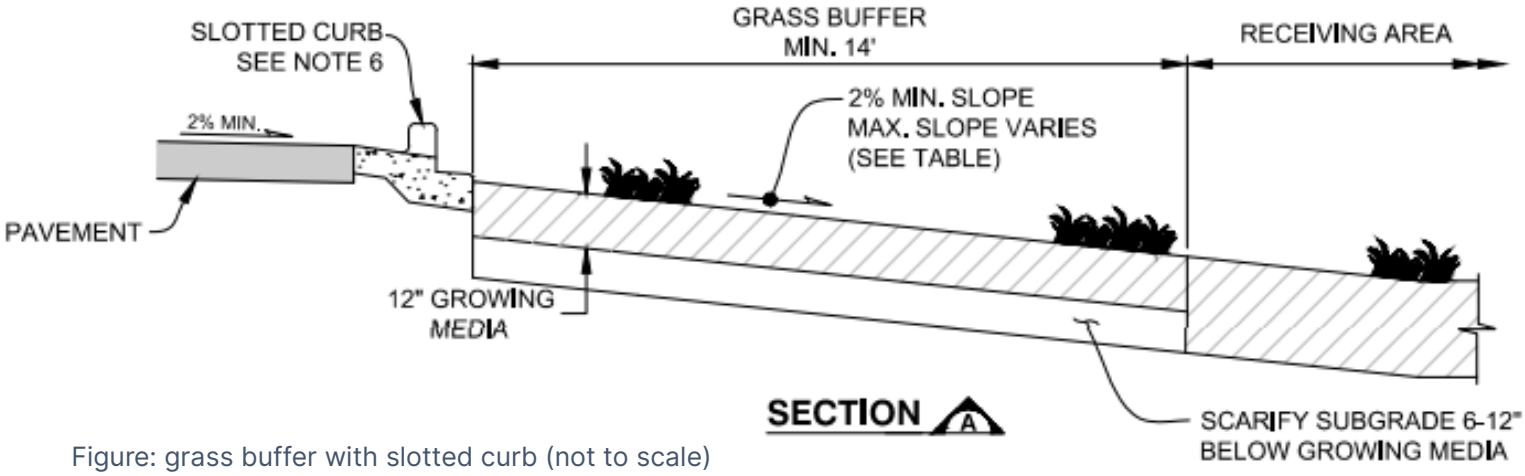

Figure: grass buffer with slotted curb (not to scale)

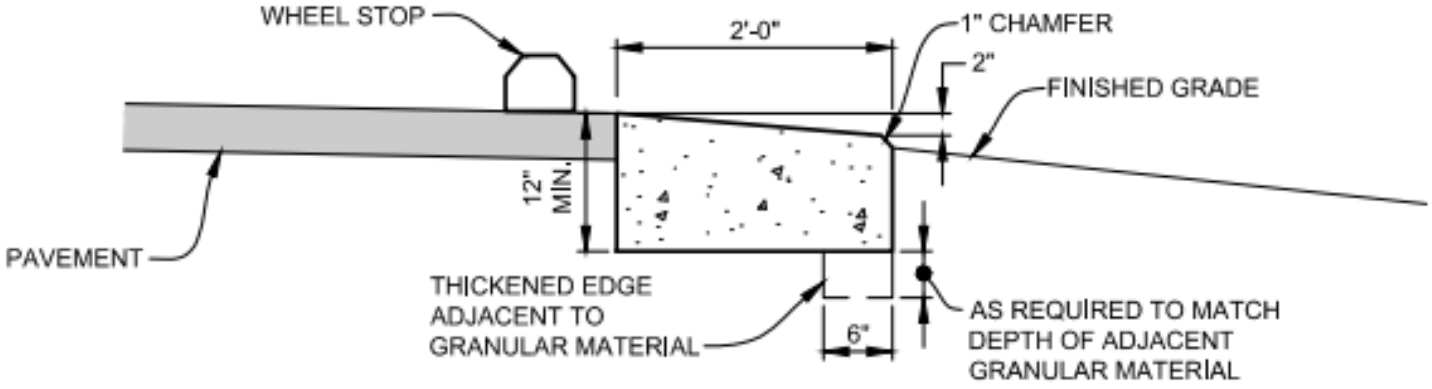

Figure: concrete edger (not to scale)

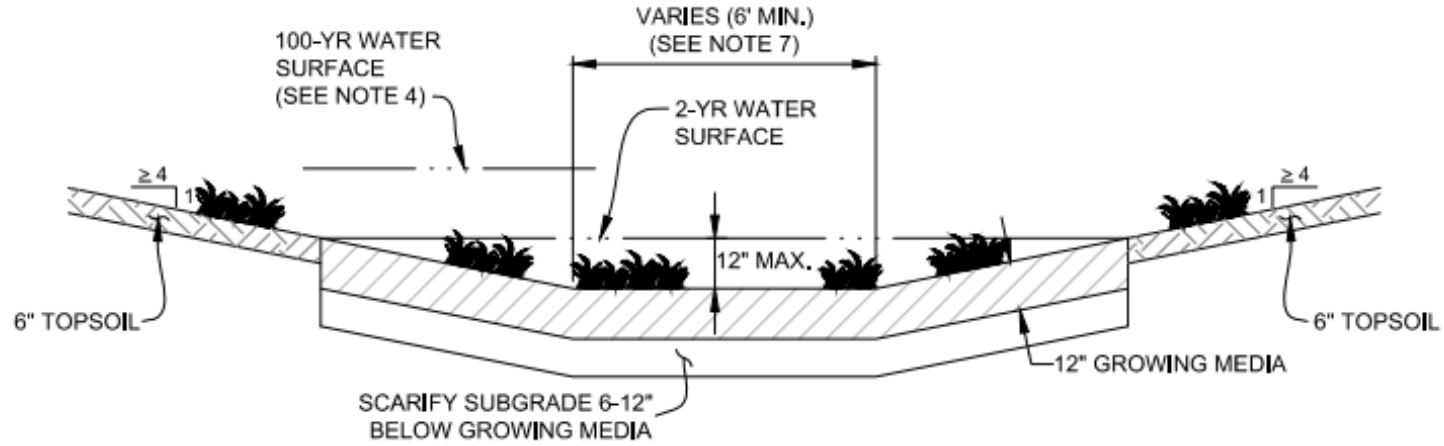

Figure: grass swale without underdrain (slopes ≥ 2%) (not to scale)

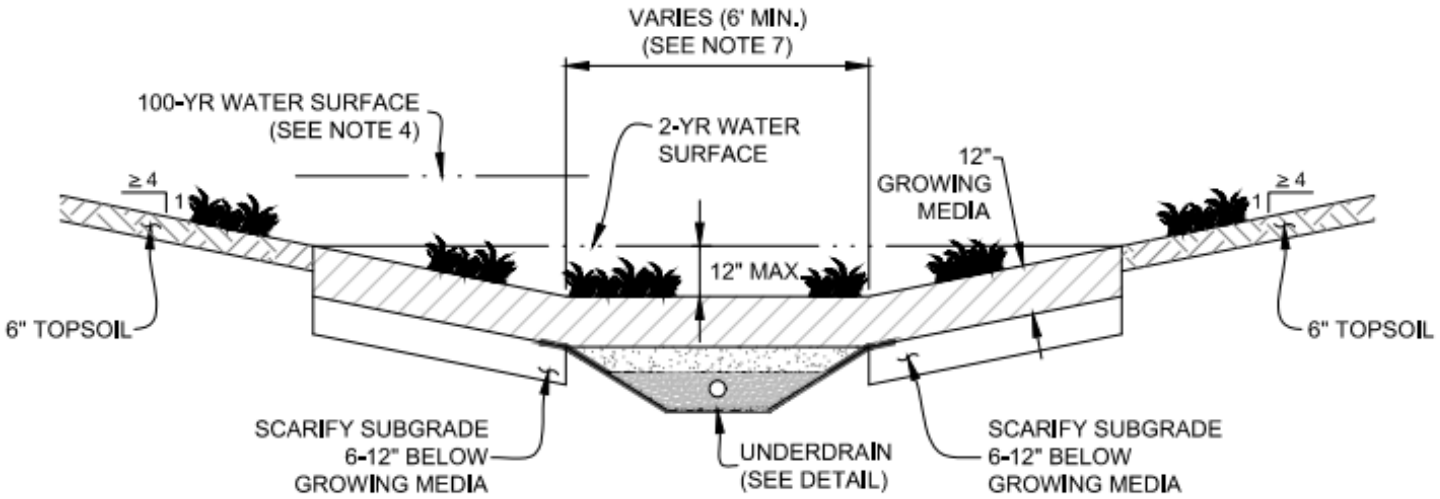

Figure: grass swale with underdrain (slopes <2%) (not to scale)

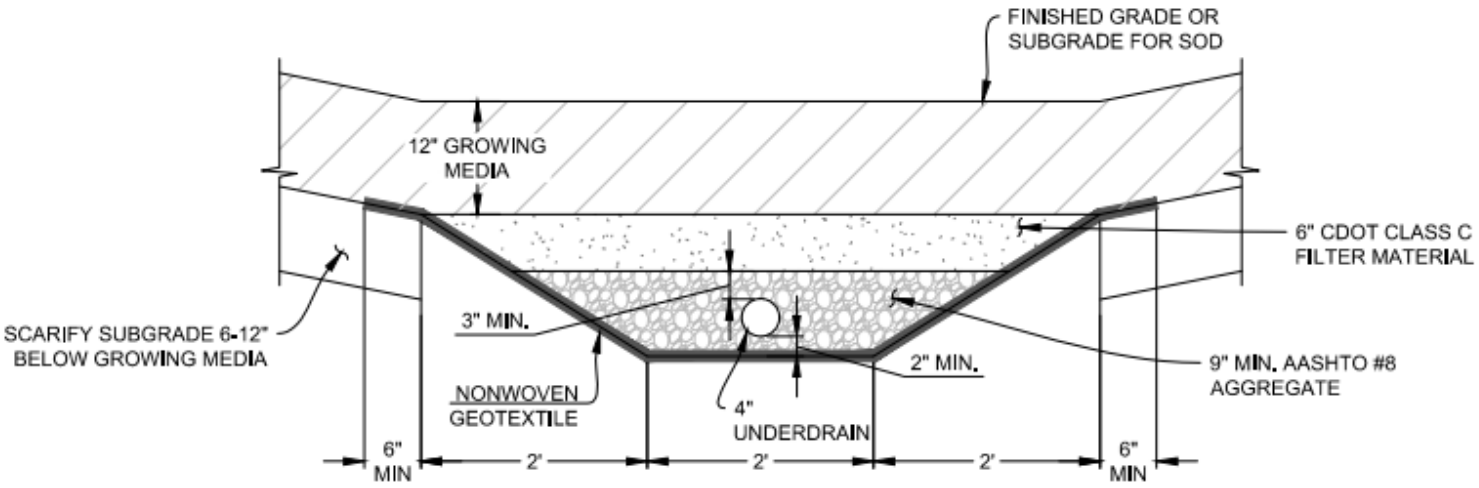

Figure: underdrain detail (not to scale)

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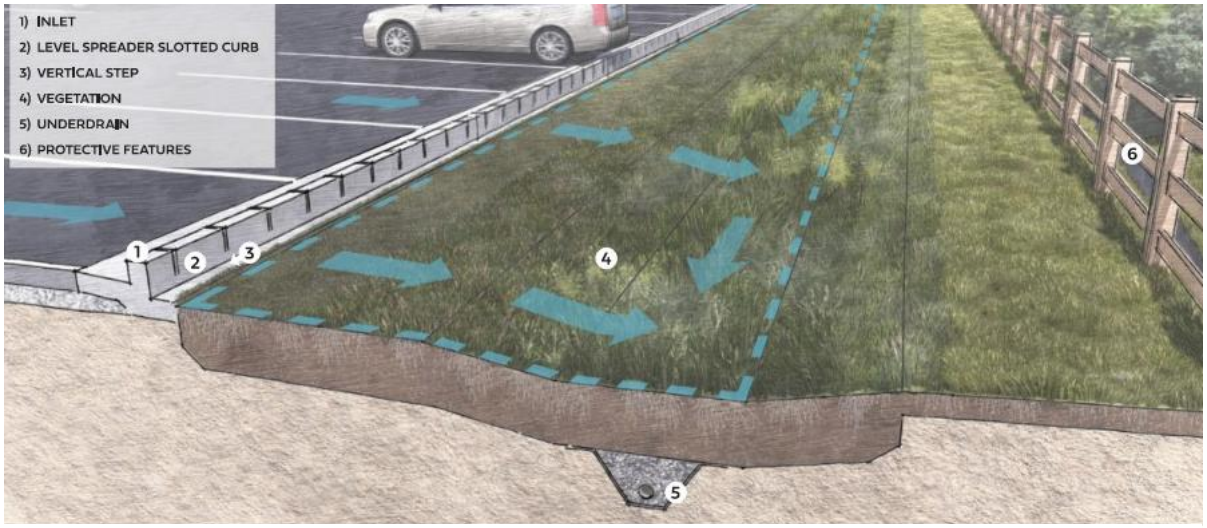

Figure RPA 1 grass buffer and grass swale components

1. Inlet
2. Level spreader and slotted curb
3. Vertical step
4. Vegetation
5. Underdrain
6. Protective features

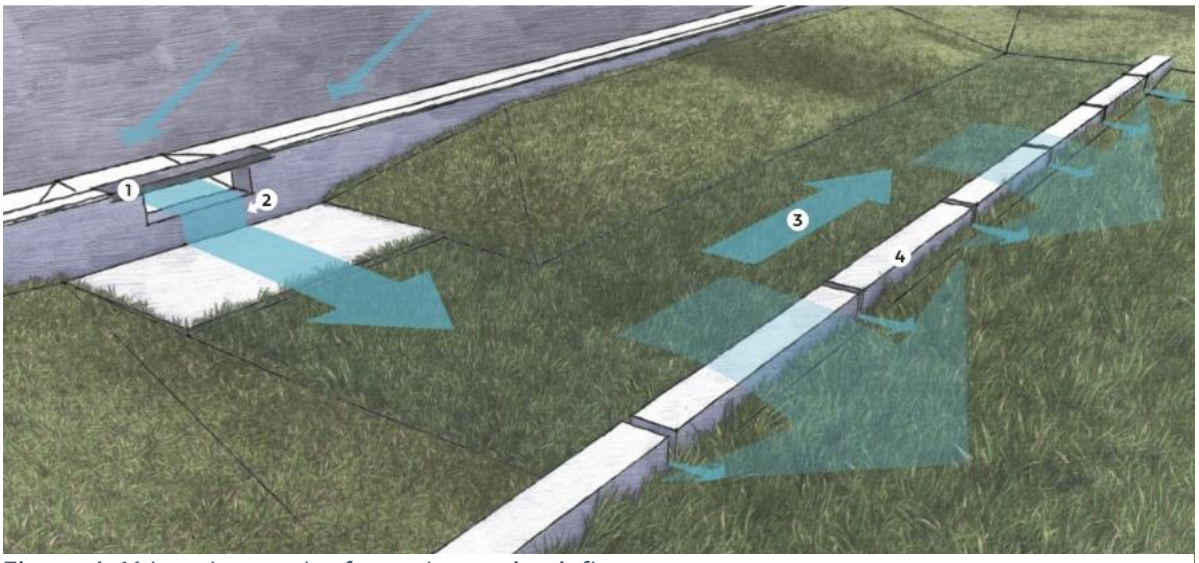

Figure 4-11 Level spreader for curb opening inflow

1. Curb opening inlet
2. Vertical drop
3. Swale
4. Level spreader with slots

Inspections

Inspect the Receiving Pervious Area (Grass Buffers and Grass Swales) at least twice annually, observing the amount of sediment in the forebay and checking for clogging in the vegetated area.

Sediment/Trash/Debris Removal

Inflow Points/Forebays

Ensure the Inflow Points (Inlets) are kept clear of sediment and debris and remove excess vegetation which will inhibit flows entering the pond. Also remove any larger bushes or trees growing directly on or next to inlets as they will cause damage over time. For RPAs with Forebays attached to inflow points, remove collected sediment and trash at least a few times per year.

Not acceptable: photograph 4-16. Inlet to swale has small riprap forebay to collect trash. Riprap and dense vegetation in swale dissipate energy. However, sediment will be difficult to remove from the riprap.

Not acceptable: photograph 6-2. A lack of sediment removal in this grass swale has resulted in a grade change due to growth over the deposition and ponding upstream.

Vegetated Area

The vegetated area should be maintained with routine trash and sediment removal at least a few times per year. Reseeding or planting may be required if vegetative density falls below 80%.

Acceptable: photograph RPA-2. RPAs including grass buffers and swales treat runoff by filtering and infiltration. For treatment to be effective, grass buffers must receive runoff as sheet flow.

Photo credit: WWE

Underdrain

If the RPA utilizes and Underdrain they should be inspected for clogging through inspection ports and the Outlet Structure at least biannually.

Mowing and Plant Care

In RPAs maintain healthy, weed-free vegetation. When starting from seed, mow native/drought-tolerant grasses only when required to deter weeds during the first three years. Following this period, mowing of native/drought tolerant grass may stop or be reduced to maintain a length of no less than six inches. Mowing of manicured grasses may vary from as frequently as weekly during the summer, to no mowing during the winter.

Not acceptable: typical Blockage

Acceptable: Hydrojet clears blockage

Not acceptable: before

Acceptable: after

Summary of RPA Maintenance Activities

Drain cleaning/jet vac

- Frequency: as needed based upon inspection
- Look for: sediment build-up/non-draining system
- Action: Clean drains/jet vac areas if needed

Erosion repair

- Frequency: as needed based upon inspection
- Look for: rills/gullies forming on side slopes, trickle channel, and other areas
- Action: Repair eroded areas, revegetate and address source of erosion

Forebay/Trickle Channel/Micropool/Outlet Structure Cleaning

- Frequency: as needed after significant rain events; minimum of twice annually
- Look for: clogged features; ponding water
- Action: remove and dispose of debris/trash/sediment to allow outlet to function properly

Major sediment removal

- Frequency: as needed based upon inspections
- Look for: large quantities of sediment/ reduced system capacity
- Action: Remove and dispose of sediment and repair vegetation or replace sand as needed

Mowing

- Frequency: twice annually
- Look for: excessive grass height/aesthetics
- Action: no less than 6-inch grass height

Structural repair

- Frequency: as needed based on inspections
- Look for: deterioration and/or damage to structural components such as broken concrete, damaged pipes, outlet structure
- Action: Structural repair to restore the structure to its original design
- Action: Remove vegetation and restore grade and surface

Stormwater Quality Feature Inspection Checklist

Feature: _____ Date: _____

Inspected by: _____

Type of Inspection: ☐ Routine ☐ Storm Event _____ (# of days since event)

General Observations:

- Is water flowing?
- Standing water (more than 48 hours after the last storm event)?
    - Depth:
- Any evidence of obstructions or erosion in vicinity of the feature that could affect performance?

General Conditions:

- Do the feature sides/slopes/bottom show signs of settling, cracking, sloughing or other problems?
- Do the embankments, emergency spillway (if applicable), or side slopes show any erosion or instability?
- Is there any evidence of animal burrowing or other activity that could contribute to instability or increased erosion?
- Is there evidence of encroachment into or improper use of the feature?
- Do vegetated areas need mowing or thinning i.e. grass, cattails, willows, trees etc.?
- Are there areas that need to be re-vegetated?
- Is there general accumulation of trash, debris and/or litter to be removed around the feature?
- Any signs of vandalism or other activity that could affect performance of the feature?
- Unusual Algae blooms? (May signal too many nutrients in runoff; identify dog activity and clippings management)

Structural Conditions:

- Are the pipes/inlets going into or out of the feature clogged or obstructed?
- If applicable are concrete trickle channels in the feature clogged, undercut or damaged? (Detention Ponds)
- If applicable is the filter media evenly distributed and unclogged? (Rain Gardens, Sand Filters, etc.)
- If applicable is the underdrain clear of sediment or debris; as viewed through inspection port? (Rain Gardens, Sand Filters, Underground features)
- If applicable is there debris or other obstructions directly in front of or inside the Outlet Structure/Overflow?
- If applicable is the orifice and/or trash rack obstructed? (Detention Ponds)
- Is there any structural damage to the outlet structure?
- Do any safety features, such as fences, gates or locks need repair or replacement?
- If applicable, do the Stormwater Educational Signage features need cleaning or repair?

Overall Feature Condition

☐ Feature has numerous or severe issues which could impact water quality or public safety and needs immediate repair.
☐ Feature has minor issues and needs maintenance.
☐ Feature has no issues of note.

Notes: