4.3-c STORM DRAIN

Alternative Names: Subsurface Drain, Pipe

Storm drain inlet conveys water to a subsurface storm drain.

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**

DESCRIPTION

A storm drain is a pipe or other conduit used to collect and convey surface runoff from paved streets and parking lots to a stable discharge point, preferably a treatment and/or infiltration facility. In the Lake Tahoe Region, municipal stormwater drains are separate from sanitary sewer systems, and, as a consequence, stormwater is commonly not treated and may be discharged to Stream Environment Zones (SEZs) or to Lake Tahoe. This section deals with underground storm drains only, refer to Section 4.3-h, A/C Swale, or 4.3-j, Rock-lined and Vegetated Swale for more details regarding open channels.

Storm drains alone have no water quality benefit and tend to increase stormwater runoff velocity and erosion potential at discharge locations. However, in a developed watershed they are often a necessary component of a drainage and treatment system that as a whole improves water quality.

APPLICABILITY

Storm drains are applicable to sites with curb and gutter systems, drainage ways, and other small runoff collection structures; however, they are most commonly installed on a neighborhood scale in densely-developed commercial/residential areas.

Advantages

- Prevents the discharge of degraded runoff water.
- Provides uninterrupted drainage of stormwater runoff.

Disadvantages

- Stormwater runoff capture devices generally reduce the time of concentration of watershed runoff, thereby increasing peak rates of runoff.
- Storm drain systems may concentrate runoff and deliver high volumes of stormwater to a single location.
- Accumulation of sediment and debris in these systems requires periodic inspection and maintenance.
- Storm drains precludes stormwater infiltration, which may be achieved through use of other conveyance systems (e.g. natural channels).

DESIGN CONSIDERATIONS

- The following guidelines are water quality design considerations for storm drains. Refer to applicable drainage design manuals within the responsible jurisdiction for requirements associated with structural integrity, drainage design, public safety, and other factors.
- Storm drains should be designed by a licensed professional civil engineer.
- Unless otherwise justified, use storm drain pipe having a diameter of at least 18 inches.
- Design pipe systems with a minimum 1 percent slope to prevent the water from freezing. The pipe may also be surrounded with gravel to provide insulation.
- Do not design transitions from larger to smaller diameter pipes.
- Protect inlets and outlets with outlet protection to prevent scouring.
- Design debris control devices at each pipe inlet, such as a trash rack, to prevent clogging and resultant damage from flooding or erosion.
- Incorporate sediment traps and basins in storm drain systems to reduce peak flows, trap sediment, and prevent clogging of downstream drainage or infiltration structures by sediment.
- Size storm drains based on the assumption that they will flow full or partially full under the design discharge, but will not be subjected to head pressure from impoundment upstream of inlets.
- Consider debris blockage potential, maintenance issues, cost implications, and physical constraints in designing the number of inlets that are connected in a series.

INSTALLATION CONSIDERATIONS

- Repair street surfaces damaged as a result of storm drain installation.
- Re-establish vegetation disturbed as a result of the storm drain installation.
- Install storm drains parallel with street centerlines wherever possible.

INSPECTION AND MAINTENANCE

The sediment at this storm drain discharge is a result of lack of maintenance within the drainage system.

EFFECTIVENESS CONSIDERATIONS

Storm drains are effective at conveying stormwater if designed and installed properly. Effectiveness is lost once clogged with sediment and debris so a regular street sweeping program is critical and will reduce overall maintenance costs. Storm drains need to be part of an associated hydrologic source control BMP system in order to reduce pollutant loads.

Storm Drain Inspection and Maintenance Table

INSPECTION AND MAINTENANCE ACTIVITIES	SUGGESTED FREQUENCY	INSPECTION EQUIPMENT	MAINTENANCE EQUIPMENT
Inspect for trash and debris on the trash rack and/or grate and in the flow path. ▪ Remove trash and debris.	Monthly (April–Oct) and before and after major storms		Trash bag
Inspect that the sediment trap or storm drain is properly capturing runoff from the impervious surface and conveying it to the treatment system. The inspection crews may want to pour water on the surface to verify connectivity. ▪ Repair any blocked or diverted conveyances.	Annually in spring and during major storms	Water Source	Tools as needed to repair
Inspect sediment traps and storm drains and measure depth of sediment to determine accumulated depth. ▪ If accumulated material has decreased sediment trap or storm drain capacity by 50%, removal of accumulated material is needed. If frequently full of sediment, consider retrofitting with a larger sump. Investigate higher in the drainage area for possible contributing sediment sources. o Remove grate. o Remove sediment and debris from sediment trap or storm drain with a vactor truck or by hand. o Dispose of sediment and debris at a stable on-site location or out of the Lake Tahoe Region.	Semi-annually (spring and fall) and after major storms	Stadia rod or Ruler	Grate removal tools Vactor Truck Shovel or Scoop Trash Bag
Inspect for contributing sediment sources to reduce the accumulation of sediment in the sediment traps and storm drains. ▪ Stabilize contributing eroding slopes and bare soil areas to prevent sediment entry. ▪ Routinely sweep the street/driveway to remove sediment before it enters the sediment traps and storm drains.	Annually in spring and after major storms		Soil Amendment, Seeds/Plants, Irrigation, Mulch, Erosion Control Blanket, Riprap, Coir Logs, Streetsweeper, Broom
Inspect for standing water 96 hours after a storm event (between April 15 and October 1). ▪ If sump is designed to retain runoff and water is present, then contact your local vector abatement office for specific instructions on controlling mosquitoes. ▪ If sump is designed to drain and water is present, then contact your local vector abatement office for specific instructions on controlling mosquitoes and remove accumulated sediment.	96 hours after major storms		Tools suggested per qualified individual
Inspect for sediment traps and storm drains structural integrity. This is best performed after sediment and debris removal. ▪ Repair or replace structurally suspect or deteriorated sediment traps or storm drains.	Annually	Qualified Individual (safety/ structural condition)	Tools as needed to repair or replace
Inspect site for unusual or unsafe conditions (snowplow damage, structural damage, dumping, vandalism, etc.). ▪ Repair structural components as necessary.	Annually in spring		Tools as needed
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 sediment traps and storm drains. ▪ Analyze Inspection and Maintenance Log for trends and recurring issues. ▪ Prepare a plan that more effectively addresses concentrated water runoff, 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