Rainwater Collection Device

Guide for Inspection & Maintenance

Rainwater collection systems are integral elements of new construction/major remodels and are designed to function for the life of the structure. These guidelines offer property owners and managers basic information on how to manage rainwater collection systems to function as designed for the life of the system. Rainwater collection systems protect water quality, including the Santa Monica Bay, are a source of new water, and make our community’s water supply more resilient.

As per SMMC 7.10.090 (r), an owner of Santa Monica property with an onsite rainwater collection system is required to inspect it each year, and complete and return the annual inspection form provided annually. The property owner, manager or a qualified professional may perform the inspection.

Contact:
Neal.Shapiro@smgov.net
310 458-8223
09/16/2019
This document addresses the key elements to manage your particular system in order to achieve optimum performance and to meet the minimum standard for passing the annual inspection required for such system. There are various types of rainwater collection systems; those listed below are commonly found in Santa Monica and have operation and maintenance procedures particular to each.

Rainwater collection systems:

- infiltration pits
- retention basins
- dry creek beds
- biofilters
- tanks, cisterns, and rain barrels
- rock/rain gardens
- permeable paving

Individual elements of rainwater collection systems:

- catch basin filters or inserts
- trench/slotted drains
- downspout filters or inserts
- rain gutters

If a rainwater collection system fails to perform as designed, rainwater can impact the following:

1. A building’s foundation.
2. Adjacent properties depending upon the system location and grade of the site.
3. Costly structural fixes to the system, a building or other personal property.
4. Water quality degradation of Santa Monica Bay, due to water pollutants contained in discharged rainwater violating the City’s compliance with the Clean Water Act.
Infiltration Pits

Background

An infiltration pit is a sub-surface chamber filled in with large rock, plastic crates, concave tubes, vertical/horizontal pipes of various materials and sizes, or other similar products in order to create a void to be filled with rainwater diverted from roofs and other impermeable surfaces (driveways, patios). The water is contained and allowed to soak into the ground.

- Generally, infiltration pits are located beneath landscaped areas, approximately five feet deep with a varying footprint depending upon the amount of rainwater required to be collected for infiltration.
- Water is diverted from impermeable surfaces to a pre-treatment catch basin, where sediment and debris are allowed to settle out before being piped to the infiltration pit.
- Typically, there is a 4” observation pipe in the middle of the pit with a pop-up cap (at grade and visible) for checking the water level in the pit. Older pits (pre-2010) do not have an observation pipe.

Infiltration Pit Overflows

- Infiltration pits are required to have an overflow.
- Infiltration pits can have horizontal gravity fed overflow pipes from the back of property to an alley, via a wall or fence, or to the street. Most pits located near the street will have a horizontal gravity fed overflow pipe leading to the street. If a property is sloped so that the overflow pipe must go uphill to reach the street or alley, an overflow basin with a sump-pump is used to push excess water out to the street (see Page 5).
- A pre-treatment catch basin can be an overflow.
- An observation pipe can be an overflow.
- If no overflow pipe to street or observation pipe exists, excess water will back up in the influent pipe and spill out where the closest downspout of building goes into an underground pipe to the pit.
Infiltration Pits

Tips for Maintaining an Infiltration Pit

Check system during a rain event

- During a rain event, walk around your building and check that the downspouts are not backing up. Is there water where they meet the underground pipe or pre-treatment basin? If you do not see any excess rainwater, then the system is working as designed.

Check your pit overflow (curb or alley opening, observation pipe, and/or pre-treatment catch basin)

- If any water is coming out of any of these devices, it can be because either a large rainfall event, or a series of multiple rain events, have filled the pit to capacity and excess water is exiting your system. Does not necessarily mean there is a problem.

- The observation pipe is the only access port to visually see if there is standing water in the pit; generally, one should not see standing water in the pit unless checking during the rainy season, or after a number of consecutive rain events.

- Standing water is a symptom that water is not soaking into the ground, that the bottom of the pit could be clogged and the pit will need to be cleaned, i.e., opened up to remove rock or plastic pieces, remove sediment, and replace rock or plastic, and close up again. May have to replace filter fabric. If there is a bottom layer of filter fabric, remove fabric and replace with four inches of sand or gravel.

Prevent sedimentation and clogs:

- Clean gutters; screen downspout opening in the gutter, see below.

- Clean out pre-treatment catch basin or basins, if present, see below.

Infiltration Pits installed prior to 2010:

- Especially for rock-filled pits installed prior to 2001, observation pipe and pre-treatment catch basins were not included. Very important to ensure gutter-downspout screening present. Rock-filled pits more easily prone to clogging if no pre-treatment.

- Pits installed prior to 2010 most likely will not have a pre-treatment catch basin. Very important to ensure gutter-downspout screening present.
Trench/Slotted Drains and w/ Filters, and Sump Pumps

Background

A trench or slotted drain is a long, narrow drain (a few inches wide and 10-20 feet long) often used for driving surfaces, like the garage approach off an alley, or driveway off a street. This drain collects rainwater from the upstream impermeable driving surface, and in some cases roof rainwater from garage or accessory building roof, and diverts that water to an infiltration pit, a cistern or other rainwater collection system.

- The drain can be open-bottom, in which case the rainwater soaks into the ground and does not drain to the pit (not common).
- The drain has a solid bottom, and rainwater flows out of the drain and to an infiltration pit or other BMP.

Tips for Maintaining Trench/Slotted Drains and Filters, if present

- If there is no downstream pre-treatment catch basin as part of the onsite infiltration system, a wire screen mesh should be covering the outgoing opening of the drain. If mesh missing, replace with new one, 1/8” or ¼” size. If the grate is broken, replace with new one.
- To clean, remove the grates and clean out debris and sediment along the bottom of the drain.
- For drains with filters, remove, clean and replace. If damaged or oil-soaked, contact vendor for new one.

Sump Pumps

Where the rainwater collection system is at the low point of the property, excess water cannot gravity overflow uphill. A vault with a sump-pump (or 2) is required to actively pump (with electricity) water uphill to alley or street.

Tips for Maintaining Sump Pumps

- Clean sump vault regularly of debris and sediment.
- Test pump(s) before rainy season to ensure working properly. Repair any problems.
- Check electrical system of pump(s).
Catch Basins

Background

Generally associated with infiltration pits from 2009 and later. A 12” square box, usually, made from plastic or concrete (prefabricated or poured in place), where roof and driving surface rainwater enters before going to the pit. Debris and sediment in the water is allowed to settle out in the basin. The filtered water exits through a screened opening and flows to the infiltration pit or equivalent device.

Tips for Maintaining a Catch Basin

- The screen prevents the debris from entering the pit, and clogging it. If mesh missing, replace with new one, 1/8” or ¼” size, or equivalent fiber material filter.
- The basin can be larger; remove any debris and sediment; can use a wet vacuum or small shovel or protected hand. Check that the screen is not broken.
- Deeper basins due to slope of property, may have a basket for debris to lift out and clean.
- The basin should have holes at the bottom, or open-bottom, to allow standing water to infiltrate, preventing standing water and potential vector problem, e.g. mosquitoes can reproduce in 72 hours.
Catch Basins w/ Filters

Background

- A stand alone device to screen or filter out various pollutants, before treated water discharged to the street.
- The catch basin should have holes at the bottom (also for a trench drain) or is open-bottom (also for trench drain), to allow standing water to infiltrate out, preventing standing water and potential vector problem, e.g. mosquitoes can reproduce in 72 hours.
- Some devices contain ‘pillows’ with a special medium to absorb oil and grease. These pillows need to be replaced periodically. Generally cannot be cleaned or washed.
- The filter is also called an insert, inserted into the slotted drain, catch basin or downspout. For the downspout, the filter/insert is sliced in-line with the downspout. Inside it, is a screen to filter out debris.
- A basin will have a screen set inside it, so water passes through it and filters out materials. The screen can be shaped as a bag, and have pillows inside to absorb oil and grease.

![Catch basin with filter inserts. The image on the far left has oil and grease pillows for pre-treatment.](image)

Tips for Maintaining Catch Basin Filters

- Filter removes soluble and insoluble materials from rainwater or stormwater, depending upon the filter type. Some filters can be taken out, washed down to clean, and put back in the device. Some filters need to be replaced with a new one. Check with the product vendor. These devices are for roof and surface flows; common for vehicular surfaces, e.g., oil, grease, & road sediment, not in-line, sub-surface drainage pipes.
- **Treatment Catch Basin with Insert Filter** – Stand alone screening and filtering device. Removes soluble and insoluble materials from rainwater or stormwater, depending upon the filter type. Some filters can be washed down to clean, and put back in the basin. Some filters need to be replaced with a new one. Check with the product vendor. This device is for surface flow; common for vehicular surfaces, e.g. oil, grease, and road sediment, but not for in-line, sub-surface drainage pipes.
Downspout Filters

Background

Downspout filters are proprietary inserts, installed in-line of the downspout, often with a removable cartridge, designed to remove debris from roof rainwater as a pre-treatment before going to a tank, landscaped feature or the street. Downspout filters are ideal for systems with an underground infiltration device, such as an infiltration pit, French drain, an above or below ground rainwater tank or biofilter.

Examples of various downspout filters.

Tips for Maintaining Downspout Filters

- Open downspout filter access door, and disconnect and remove the filter. Clean out debris, rinse/wash the filter/screen, and replace. If there is damage to filter, breaks in screen, call vendor for the proper replacement part.
Rainwater Collection Device
Guide for Inspection & Maintenance
Tanks, Cisterns and Rain Barrels

Background

Rainwater storage tanks are receptacles of various sizes, shapes, and materials for collecting and storing rainwater, typically in a rain barrel or cistern (larger barrel). Generally, the tank will have a pre-treatment stage or device to remove larger particles, debris, and litter from rainwater BEFORE it enters the storage tank. This device is also called a first flush device and is wall-mounted along the downspout before the tank. Pre-treatment can be a screen over the tank opening below the downspout.

Rainwater storage tanks in various shapes and sizes

Below, First Flush devices.

Tips for Maintaining Tanks, Cisterns and Rain Barrels

- The pre-treatment stage or first flush device should be cleaned before the rainy season. Rinse the pre-treatment screen at the top of the tank before, during and after the rainy season.

- First flush systems vary with type. Consult with your contractor or inspection vendor on what cleaning strategy is necessary as it may be a vertical pipe to drain dirty water or a screen to clean out.

- Each year, after the stored rainwater is used up, check for a build up of sediment at the tank bottom. This sediment layer should be removed after a inch or two in depth, if the tank can be accessed or laid on side to wash out.

- Check for any leaks in the tank or connections or hose bib. Fix any leaks.
Landscaped Areas: Rock/Rain Gardens, Dry Creek Beds, Biofilters & Retention Basins

Background
A landscaped area where roof and driving surface rainwater is directed for retention, ponding, filtering and eventual infiltration into the soil.

Tips for Maintaining Landscaped Areas
- A landscaped area should be maintained by removing leaf debris and fine sediments from the area to ensure that the percolation rate through the landscape cover (rocks, plants, mulch, grass) is adequate so that retained rainwater infiltrates through the surface within 72 hours.
Rain Gutters

Background

A rain gutter is a narrow horizontal trough or duct at the roof’s baseline which collects rainwater from the roof of a building and diverts it away from the structure, via a downspout, which is a vertical pipe to carry rainwater from a roof gutter to a drain or to ground level.

Besides collecting rainwater, the gutters transport whatever materials are carried off the roof by rainwater, e.g. leaves, particles, animal parts and excrement, and other human materials if roof is accessible for activities.

Tips for Maintaining Gutters

- Gutters require regular annual cleaning, especially prior to the rainy season. Screens can be installed along the entire length of gutters to keep material out, or at the gutter juncture for the downspout, the round opening in the gutter. This strategy reduces the likelihood of clogging of any pre-treatment device and collection devices further down the line.
- If roof screens are damaged, repair the damaged section.
- If the gutter-downspout juncture screen is damaged or missing, replace.
Permeable Paving

Background

Permeable paving varies from proprietary products (concrete or similar earth material or plastic pavers or modules, or rolled product or matrix) or to generic materials (poured in place concrete blocks with permeable gaps, or permeable concrete).

Examples of permeable driveways, approaches and walkways

Tips for Maintaining Permeable Paving

- The system should be cleaned regularly, e.g. swept and vacuumed (where applicable, where vacuuming will not suck up infill, such as unbound decomposed granite and small rock), to prevent the build up of sediment and debris, which can clog or block the permeable matrix and prevent infiltration through the permeable system.