

ROOF RUNOFF CONTROLS – FACT SHEET

Various roof runoff controls are available to address storm water that drains off rooftops. The objective is to reduce the total volume and rate of runoff from individual lots, and retain the pollutants on site that may be picked up from roofing materials and atmospheric deposition. Roof runoff controls consist of directing the roof runoff away from paved areas and mitigating flow to the storm drain system through one of several general approaches.

Gutters and Downspouts Direct Roof Runoff:

Be sure that your roof is properly fitted with gutters and downspouts that will release water onto a non-erodible surface such as a paved driveway. Or you can connect downspouts firmly to solid plastic pipe that will carry water downslope away from your home to a place where it will be released safely such as a paved roadside or storm drain ditch. Because twigs, pine needles and leaves can clog gutters and downspouts, the use of gutter guards of ¼ to ½ inch hardware cloth screen is highly recommended. Clear your gutters regularly and inspect them to insure your roof runoff system is working properly.

Curbs and Berms Protect Sensitive Slopes:

A concrete curb, a compacted earth berm, or other similar structures on the outside edge of a driveway or building pad can direct runoff away from sensitive slopes to an area where it can be released safely. The recommended height of the berm is a minimum of 12-18 inches. (see other fact sheets for information on temporary flood barriers). A pipe drop may be used to carry runoff downslope to a place where it can be released safely, such as a lined roadside ditch or storm drain.

Proper Grading:

Proper grading of your land helps prevent water from pooling around foundations, flooding basements or below grade structural components, and concentrating water into destructive volumes. In general, grade surfaces around a home so runoff flows away from foundations at a minimum slope of 1-2 feet for every 100 feet. Grade and compact surfaces evenly since water can collect in depressions or channelize into destructive flows.

Foundation Planting:

Landscape planting can be provided around the base to allow increased opportunities for storm water infiltration and protect the soil from erosion caused by concentrated sheet flow coming off the roof. Foundation plantings can reduce the physical impact of water on the soil and provide a subsurface matrix of roots that encourage infiltration. These plantings must be sturdy enough to tolerate the heavy runoff sheet flows, and periodic soil saturation.

Cisterns or Rain Barrels:

One method of addressing roof runoff is to direct roof downspouts to cisterns or rain barrels. A cistern is an above ground storage vessel with either a manually operated valve or a permanently open outlet. Roof runoff is temporarily stored and then released for irrigation or infiltration between storms. The number of rain barrels needed is a function of the rooftop area. Some low impact developers recommend that every house have at least two rain barrels, with a minimum storage capacity of 1000 liters. Roof barrels serve several purposes including mitigating the first flush from the roof which has a high volume, amount of contaminants, and thermal load. Several types of rain barrels are commercially available. Consideration

must be given to selecting rain barrels that are vector proof and childproof. In addition, some barrels are designed with a bypass valve that filters out grit and other contaminants and routes overflow to a soak-away pit or rain garden.

If the cistern has an operable valve, the valve can be closed to store storm water for irrigation or infiltration between storms. This system requires continual monitoring by the resident or grounds crews, but provides greater flexibility in water storage and metering. If a cistern is provided with an operable valve and water is stored inside for long periods, the cistern must be covered to prevent mosquitoes from breeding.

A cistern system with a permanently open outlet can also provide for metering storm water runoff. If the cistern outlet is significantly smaller than the size of the downspout inlet (say $\frac{1}{4}$ to $\frac{1}{2}$ inch diameter), runoff will build up inside the cistern during storms, and will empty out slowly after peak intensities subside. This is a feasible way to mitigate the peak flow increases caused by rooftop impervious land coverage, especially for the frequent small storms.

Dry Wells and Infiltration Trenches:

Roof downspouts can be directed to dry wells or infiltration trenches. A dry well is constructed by excavating a hole in the ground and filling it with an open graded aggregate, and allowing the water to fill the dry well and infiltrate after the storm event. An underground connection from the downspout conveys water into the dry well, allowing it to be stored in the voids. To minimize sedimentation from lateral soil movement, the sides and top of the stone storage minimize sedimentation from lateral soil movement, the sides and top of the stone storage matrix can be wrapped in a permeable filter fabric, though the bottom may remain open. A perforated observation pipe can be inserted vertically into the dry well to allow for inspection and maintenance.

In practice, dry wells receiving runoff from single roof downspouts have been successful over long periods because they contain very little sediment. They must be sized according to the amount of rooftop runoff received, but are typically 4 to 5 feet square, and 2 to 3 feet deep, with a minimum of 1-foot soil cover over the top (maximum depth of 10 feet).

To protect the foundation, dry wells must be set away from the building at least 10 feet. They must be installed in solids that accommodate infiltration. In poorly drained soils, dry wells have very limited feasibility.

Infiltration trenches function in a similar manner and would be particularly effective for larger roof areas. An infiltration trench is a long, narrow, rock-filled trench with no outlet that receives storm water runoff.

Pop-up Drainage Emitter:

Roof downspouts can be directed to an underground pipe that daylights some distance from the building foundation, releasing the roof runoff through a pop-up emitter. Similar to a pop-up irrigation head, the emitter only opens when there is flow from the roof. The emitter remains flush to the ground during dry periods, for ease of lawn or landscape maintenance.

Drainage for Retaining Walls:

Good drainage must be provided for solid construction retaining walls. Properly placed weep holes and perforated pipe with a gravel backfill behind the wall work well. The small openings between wood boards or non-grouted brick, stone or concrete block retaining walls serve this purpose. Many walls are not designed for saturated soils or ponded water behind them and can break, tip over or slide if this is not prevented with good drainage behind them.

Runoff Diversions:

A diversion may be needed to handle surface runoff flowing onto your property from upslope. For slopes steeper than 2%, or where large amounts of water are expected, the diversion channel will require an erosion resistant lining. Direct water to a safe, non-erodible outlet --never directly onto the downstream slope itself. Never direct water onto adjoining property without consulting the owners. Always consult a qualified engineer to design water diversion measures.

Maintenance:

Regular maintenance of drainage systems will keep your drainage problems to a minimum.

- Check gutters, downspouts and pipes during and after storms and remove debris that might cause clogging.
- Regularly inspect, clean, and repair berms and ditches as necessary.
- Check for and repair any damage caused by burrowing animals.
- Seed and mulch or otherwise vegetate all bare areas, especially on slopes.
- Regular maintenance saves time and money in the long run.

Safety Measures:

- Do not start any work until you are assured that both above-ground and underground utility lines will not be affected by your work. Information on the location of underground utility lines can be obtained by calling Digger's Hotline at 800-242-8511.
- Do not release runoff onto the base of structural foundations.