

LID ELEMENT #13: DOWNSPOUT INFILTRATION SYSTEMS

OBJECTIVE

Increase infiltration and reduce effective impervious surfaces through routing roof downspouts to infiltration systems.

CONSIDERATIONS

The City of Olympia requires on-site management of roof runoff through infiltration or dispersion within Minimum Requirement #5 of the Drainage Design and Erosion Control Manual (DDECM). It is assumed that the City will adopt a new DDECM that complies with the 2012 Ecology Stormwater Management Manual for Western Washington (Ecology Manual). The new Manual will include additional roof downspout BMP's and up to date design information for downspout infiltration options. The use and design of rain gardens will also be addressed. Therefore, the options developed have not been focused on whether to allow downspout infiltration systems or specific design options, but rather on considerations related to code adoption.

TRADITIONAL ROOF DRAINAGE SYSTEMS

Prior to adoption of requirements addressing the treatment of stormwater, roof runoff was often allowed to mix with the polluted runoff generated by parking lots and driveways. When water quality treatment requirements were implemented in the early 1990's, separation of roof runoff, which is considered clean water, from the polluted runoff from parking lots and other vehicular areas became common. By preventing the mix of the clean roof runoff with the polluted runoff, the volume of required water quality treatment was minimized.

The early 1990's also introduced roof downspout Best Management Practices (BMPs). The 1992 Ecology Stormwater Manual included BMP RI.15 Roof Downspout Systems which was an infiltration system specifically for roof runoff. The 1992 Drainage Design and Erosion Control Manual for Olympia also included specific design information for roof drain infiltration, based on the Ecology requirements. Roof drain infiltration has been an ongoing practice in Olympia for many years.

"As density increases so the percentage of surface flow associated with roof-tops. At the same time, the available area to manage the roof water at the ground level decreases."

*Low Impact Development
Technical Guidance Manual
for Puget Sound, Puget Sound
(2012)*

In 2005, Olympia shifted from allowing certain drainage practices regarding roof runoff to requiring roof downspout controls. The required controls included an option for infiltration or dispersion.

CODES AND STANDARDS REVIEWED

Drainage Design and Erosion Control Manual (DDECM)

Volumes 1 and 3

Engineering Design and Development Standards (EDDS)

Standard Details 5-10A1 and 5-10A2

Requirements for handling of roof drainage are specified in the DDECM.

BENEFITS OF ROOF DRAIN INFILTRATION

A key component of low impact design is to mimic the pre-disturbance hydrologic processes of infiltration, filtration and storage. For sites with infiltrative soils, the use of roof drainage infiltration systems achieves these goals. These systems have the added benefit of separating roof runoff (clean water) from polluted runoff from parking lots and similar uses. Using roof drain infiltration methods aids in reducing the overall effective impervious surface coverage for a site. Reductions in effective – or hydraulically connected – areas of impervious surface are an important step in maintaining natural site hydrology necessary in low impact development practices.

OLYMPIA CODE ANALYSIS

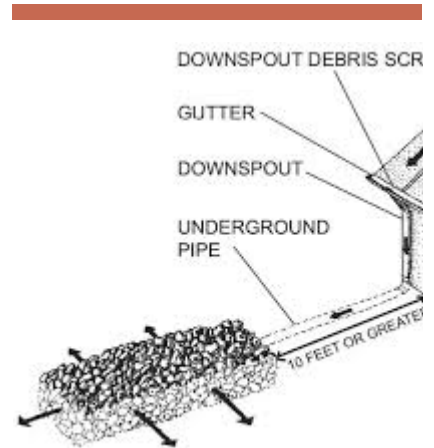
Requirements for handling of roof drainage are specified in the DDECM. Roof downspout controls are specifically identified in Volume 3, Section 3.1 and include downspout infiltration systems and downspout dispersion systems (splash blocks). The requirement for use of downspout control systems is specified in Volume 1 under Minimum Requirement #5, Onsite Stormwater Management.

CITY EXPERIENCE WITH CURRENT SYSTEMS

Roof drainage infiltration systems have been used in the City for many years. Overall the experience has been positive and the systems have proven effective. There are some challenges that should be addressed as part of code updates:

Maintenance – Because downspout infiltration systems are underground, they are often overlooked for regular maintenance. This is especially true of residential downspout infiltration systems where homeowners often aren't aware of the presence of the system on their parcel and its maintenance requirements.

Proximity to Crawlspace and Basements – Ten foot setbacks from building foundations and basements are required for roof drain infiltration systems. On some lots, setbacks are very limited. In addition, the DDECM requires calculations to demonstrate that saturated areas resulting from roof infiltration will fall one foot below the lowest floor elevation in the building. However, despite these requirements, sometimes infiltration into building spaces occurs. Often this can be linked to poor maintenance and system failure.



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OPTIONS CONSIDERED

- Option 1: Update DDECM to adopt Ecology Manual requirements for roof downspout controls without edit.
- Option 2: Update DDECM to adopt Ecology Manual requirements for roof downspout controls but add Olympia specific edits including: requirements to encourage increased maintenance – possibly adding documentation on plats regarding downspout systems; specific rain garden guidelines based on the *Rain Garden Handbook for Western Washington*; and potentially other modifications based on Olympia experience with roof downspout infiltration systems.

ANALYSIS

Option 1 – This option would update current City practices for roof drainage systems to allow additional roof drainage infiltration options included in the Ecology Manual such as rain gardens. It will also update design requirements to the latest criteria. However, Option 1 would not reflect changes specific to the City of Olympia and would instead adopt the downspout management practices suggested by Ecology in their entirety.

Option 2 – This option would update the DDECM to include current options for roof downspout controls suggested by Ecology, but would also make edits to reflect City of Olympia specific guidance. Roof drain infiltration systems have been in use for a long time in the City with good result, and there have been lessons learned that could be incorporated into the DDECM update. By using the concepts presented in the Ecology Manual and incorporating the ones that will work best in Olympia, more options for managing roof runoff will be available, but the standards will be tailored to the needs of the City.

RECOMMENDATION

Staff recommends Option 2. This option allows for updating requirements for downspout infiltration systems while maintaining and updating Olympia specific edits.

Option 1 updates standards but would not incorporate Olympia specificity.

