

3.1.1 Downspout Full Infiltration Systems (BMP T5.10A)

Downspout full infiltration systems are trench or drywell designs intended only for use in infiltrating runoff from roof downspout drains. They are not designed to directly infiltrate runoff from pollutant-generating impervious surfaces.

Application

Projects subject to Minimum Requirement #5 (Section 2.5.5, Volume I) must provide for individual downspout full infiltration systems or full dispersion if feasible. Evaluate the feasibility, or applicability, of downspout full infiltration unless full dispersion is proposed. Use the evaluation procedure below to determine the feasibility of downspout full infiltration.

Flow Credit for Roof Downspout Full Infiltration

If roof runoff is infiltrated according to the requirements of this section, the roof area may be discounted from the project area used for sizing stormwater facilities.

Procedure for Evaluating Feasibility

1. Have one of the following prepare a soils report to determine if soils suitable for infiltration are present on the site:
 - A professional soil scientist certified by the Soil Science Society of America (or an equivalent national program)
 - A locally licensed on-site sewage designer
 - A suitably trained person working under the supervision of a professional engineer, geologist, hydrogeologist, or engineering geologist registered in the State of Washington.

The report shall reference a sufficient number of soils logs to establish the type and limits of soils on the project site. The report should at a minimum identify the limits of any outwash type soils (i.e., those meeting USDA soil texture classes ranging from coarse sand and cobbles to medium sand) versus other soil types and include an inventory of topsoil depth.

2. If the lots or site does not have outwash or loam soils, and full dispersion is not feasible, then consider a rain garden or bioretention BMPs (the next lower priority on-site stormwater management system).
3. Complete additional site-specific testing on lots or sites containing outwash (coarse sand and cobbles to medium sand) and loam type soils.

Individual lot or site tests must consist of at least one soils log at the location of the infiltration system, a minimum of 4 feet in depth from the proposed grade and at least 1 foot below the expected bottom elevation of the infiltration trench or dry well.

Identify the NRCS series of the soil and the USDA textural class of the soil horizon through the depth of the log, and note any evidence of high ground water level, such as mottling.

4. Downspout infiltration is considered feasible on lots or sites that meet all of the following:
 - 3 feet or more of permeable soil from the proposed final grade to the seasonal high ground water table.
 - At least 1-foot of clearance from the expected bottom elevation of the infiltration trench or dry well.
 - The downspout full infiltration system can be designed to meet the minimum design criteria specified below.

***Design Criteria
for Infiltration
Trenches***

Figure 3.1.2 shows a typical downspout infiltration trench system, and Figure 3.1.3 presents an alternative infiltration trench system for sites with coarse sand and cobble soils. These systems are designed as specified below.

General

1. The following minimum lengths (linear feet) per 1,000 square feet of roof area based on soil type may be used for sizing downspout infiltration trenches.

Coarse sands and cobbles	20 LF
Medium sand	30 LF
Fine sand, loamy sand	75 LF
Sandy loam	125 LF
Loam	190 LF
2. Maximum length of trench shall not exceed 100 feet from the inlet sump.
3. Minimum spacing between trench centerlines shall be 6 feet.
4. Filter fabric shall be placed over the drain rock as shown on [Figure 3.1.2](#) prior to backfilling.
5. Infiltration trenches may be placed in fill material if the fill is placed and compacted under the direct supervision of a geotechnical engineer or professional civil engineer with geotechnical expertise, and if the measured infiltration rate is at least 8 inches per hour. Trench length in fill must be 60 linear feet per 1,000 square feet of roof area. Infiltration rates can be tested using the methods described in [Section 3.3](#).
6. Infiltration trenches should not be built on slopes steeper than 25% (4:1). A geotechnical analysis and report may be required on slopes over 15 percent or if located within 200 feet of the top of slope steeper than 40%, or in a landslide hazard area.

***Design Criteria
for Infiltration
Drywells***

7. Trenches may be located under pavement if a small yard drain or catch basin with grate cover is placed at the end of the trench pipe such that overflow would occur out of the catch basin at an elevation at least one foot below that of the pavement, and in a location which can accommodate the overflow without creating a significant adverse impact to downhill properties or drainage systems. This is intended to prevent saturation of the pavement in the event of system failure.

Figure 3.1.4 shows a typical downspout infiltration drywell system. These systems are designed as specified below.

General

1. Drywell bottoms must be a minimum of 1 foot above seasonal high ground water level or impermeable soil layers.
2. When located in coarse sands and cobbles, drywells must contain a volume of gravel equal to or greater than 60 cubic feet per 1000 square feet of impervious surface served. When located in medium sands, drywells must contain at least 90 cubic feet of gravel per 1,000 square feet of impervious surface served.
3. Drywells must be at least 48 inches in diameter (minimum) and deep enough to contain the gravel amounts specified above for the soil type and impervious surface served.
4. Filter fabric (geotextile) must be placed on top of the drain rock and on trench or drywell sides prior to backfilling.
5. Spacing between drywells must be a minimum of 10 feet.
6. Downspout infiltration drywells must not be built on slopes greater than 25% (4:1). Drywells may not be placed on or above a landslide hazard area or on slopes greater than 15% without evaluation by a professional engineer with geotechnical expertise or a licensed geologist, hydrogeologist, or engineering geologist, and with jurisdiction approval.

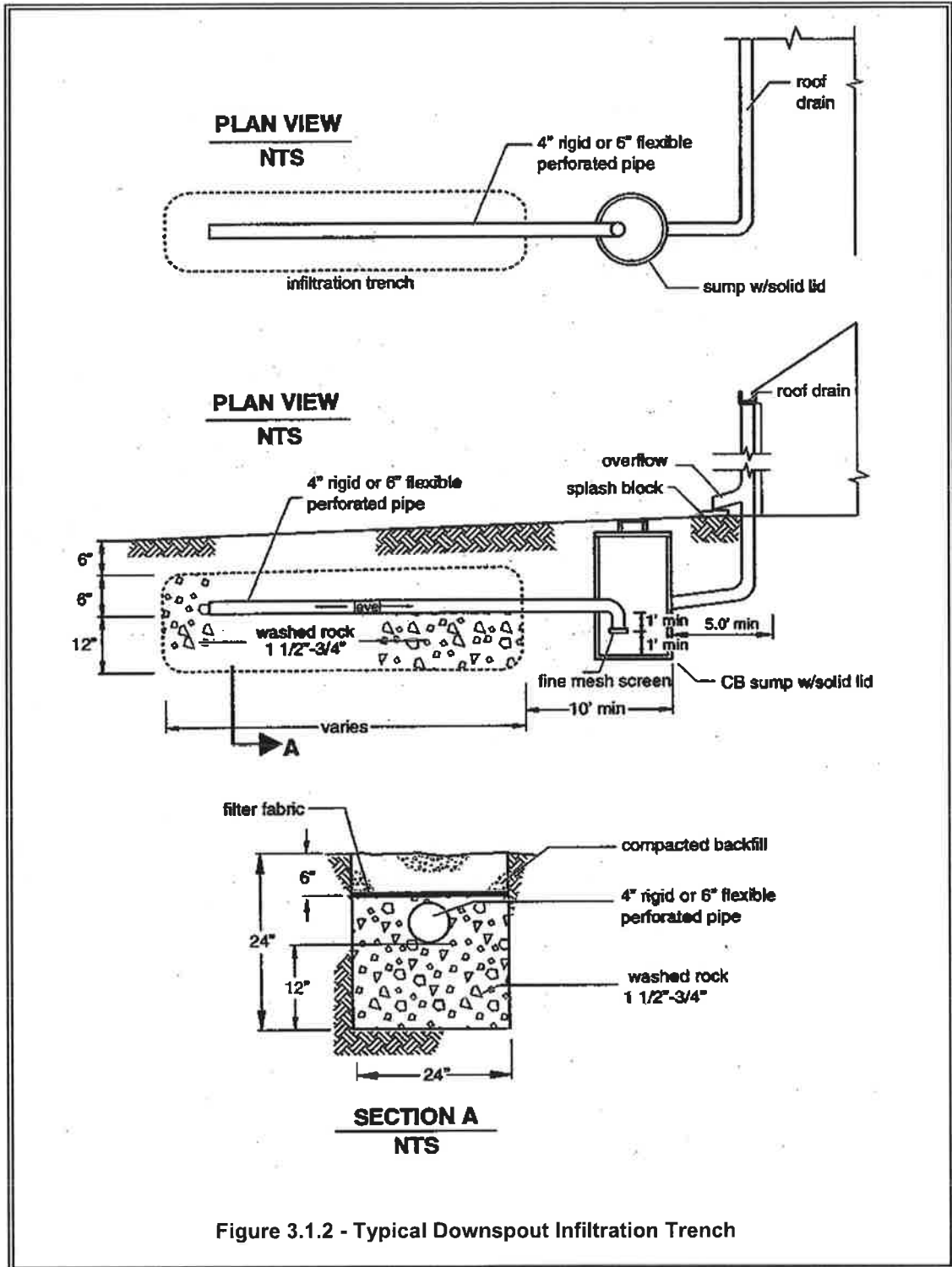


Figure 3.1.2 - Typical Downspout Infiltration Trench

Source: King County

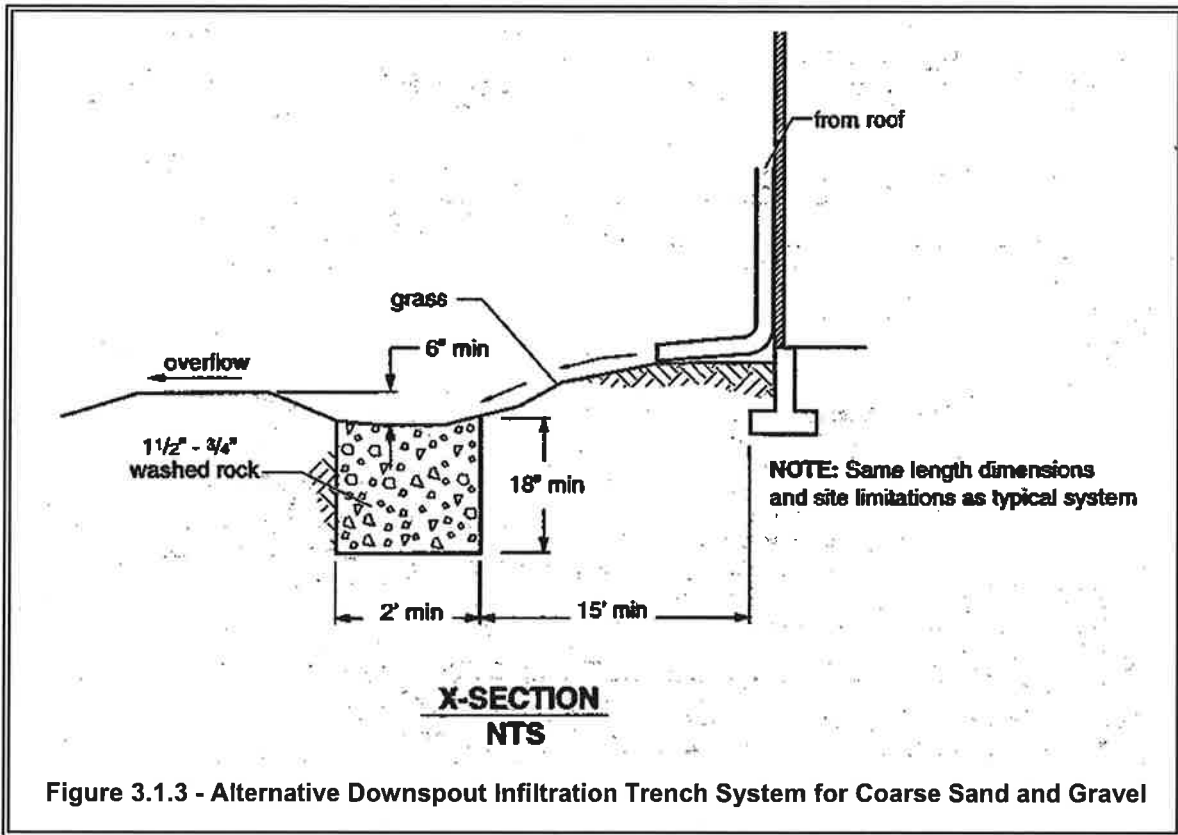


Figure 3.1.3 - Alternative Downspout Infiltration Trench System for Coarse Sand and Gravel

Source: King County

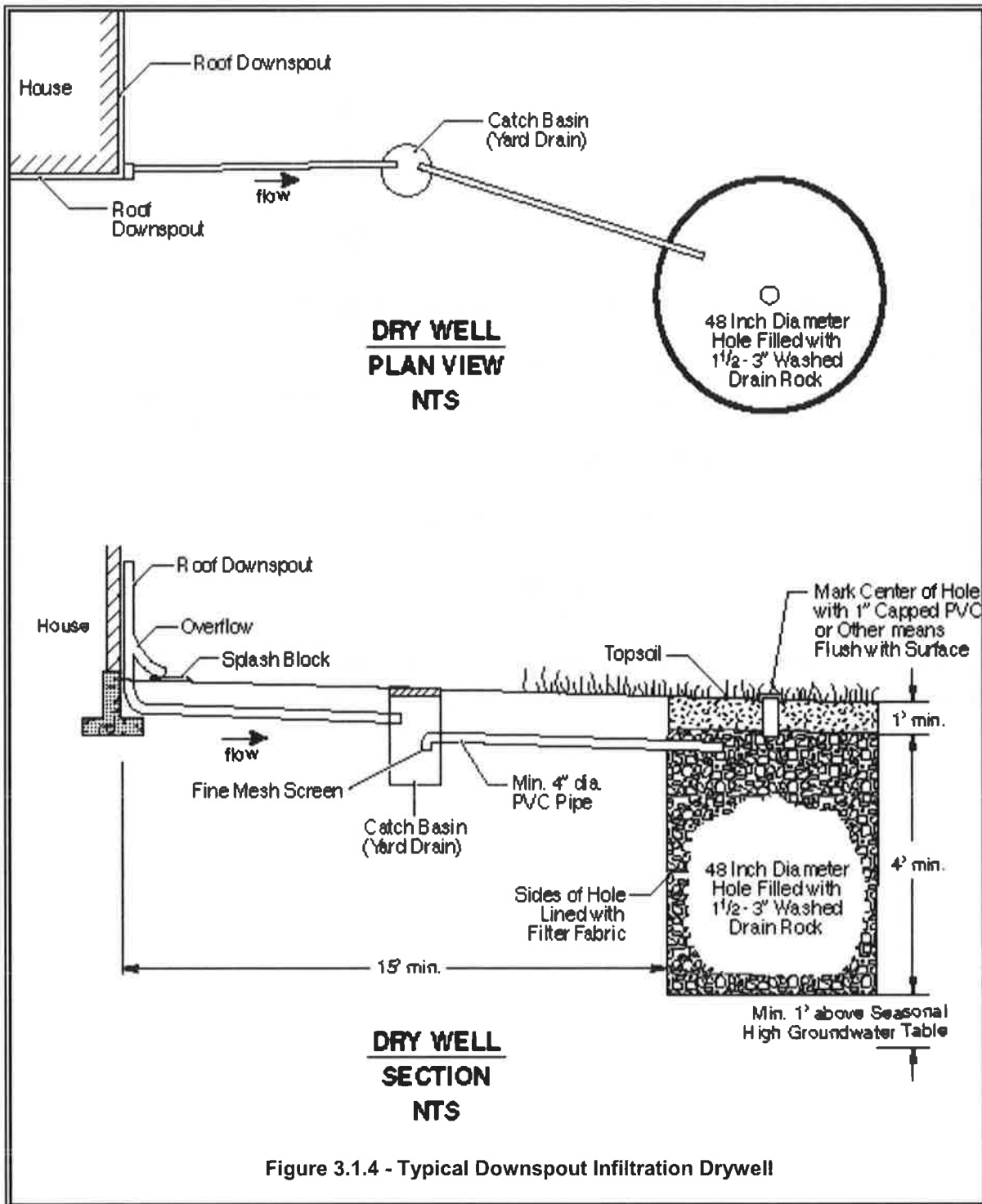


Figure 3.1.4 - Typical Downspout Infiltration Drywell

Source: King County

Setbacks

Local governments may require specific setbacks in sites with slopes over 40%, land slide areas, open water features, springs, wells, and septic tank drain fields. Adequate room for maintenance access and equipment should also be considered. Examples of setbacks commonly used include the following:

1. All infiltration systems should be at least 10 feet from any structure, property line, or sensitive area (except slopes over 40%).
2. All infiltration systems must be at least 50 feet from the top of any slope over 40%. This setback may be reduced to 15 feet based on a geotechnical evaluation, but in no instances may it be less than the buffer width.
3. For sites with septic systems, infiltration systems must be downgradient of the drainfield unless the site topography clearly prohibits subsurface flows from intersecting the drainfield.

