

PERMIT CENTER

HANDOUT FOR SINGLE FAMILY RESIDENTIAL ROOF DOWNSPOUT AND FOOTING DRAIN CONSTRUCTION

February, 2010

Infiltration Information
Infiltration System Detail
Residential Footing Drain Detail

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Residential Roof Downspouts

Roof downspout controls are simple pre-engineered designs for infiltrating or dispersing runoff from roof areas. The following disposal methods are the typical methods used and are allowed to manage the runoff from single family residential home construction projects. For roof areas below 10,000 square feet, these designs may typically be implemented with a single test pit, unless otherwise directed by the City. For roof areas greater than 10,000 square feet, please refer to Minimum Requirement #7 located in the City of Auburn Surface Water Management Manual (SWMM) Volume I, Chapter 3.

1. Selection of Roof Downspout Controls

Large lots in rural areas typically have adequate area to disperse or infiltrate their roof runoff. Lots created in urban areas typically will be smaller and have a limited amount of area in which to disperse stormwater. Downspout infiltration is a method that may be used in areas where the soils are determined to be suitable. Where infiltration and/or dispersion methods are not feasible, or where there is a potential for creating drainage problems on adjacent lots, or if the project is located in a geologically hazardous area, downspouts may be connected to the street storm drain system.

Where roof downspout controls are planned, the following methods should be considered:

- Downspout infiltration systems
- Downspout dispersion systems
- Collection and conveyance to the City stormwater system is only allowed if it can be demonstrated that infiltration and dispersion are not feasible
- Rain Gardens

Typical methods for providing downspout infiltration or dispersion systems and downspout conveyance to the City stormwater system are discussed in this handout. Information for additional or alternative downspout controls, such as rain gardens, can be found in the SWMM (Volume VI, Chapter 2, Section 2.2.3.1).

A. Downspout Infiltration Systems

Downspout infiltration systems are trenches intended only for use in infiltrating runoff from roof downspout drains. They are not designed to infiltrate runoff from pollutant-generating impervious surfaces such as driveways. SWMM Volume V, Chapter 5 contains a discussion of infiltration systems for pollutant-generating areas.

Application

Use downspout infiltration on all sites that have the appropriate area for infiltration and soil type.

Design Criteria for Infiltration Trenches

Figure 1 (Standard Detail Storm 05), attached, shows a typical downspout infiltration trench system, and Figure 2 (SWMM Figure III-2-2), attached, 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 (in linear feet [LF]) 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 an individual infiltration trench must not exceed 100 feet from the inlet sump. Parallel or multiple trenches are allowed in order to meet the minimum required length.
3. Minimum spacing between trenches shall be 4 feet measured from the edge of each trench.
4. Filter fabric must be placed over the drain rock as shown on Figure1 prior to backfilling.
5. Three feet of permeable soil, measured from the proposed final grade to the seasonal high groundwater table is required for the infiltration area.
6. A minimum of 1 foot of separation is required from the bottom of the infiltration trench to the seasonal high groundwater table.
7. For roof areas below 10,000 square feet, the soil type may be determined with a single test pit, unless otherwise directed by the City

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.

Setbacks

The City requires specific setbacks for sites with steep slopes, landslide areas, open water features, springs, wells, and septic tank drain fields. Adequate room for maintenance access and equipment should also be considered in locating and sizing your facility. The minimum required downspout infiltration system setbacks are as follows or as determined by a qualified geotechnical engineer:

- I. Infiltration trenches shall not be built on slopes steeper than 20 percent (5Horizontal:1Vertical). A geotechnical analysis and report shall be required on slopes over 15 percent or if located within 200 feet of the top of a steep slope (40% or greater) or landslide hazard area.
- II. All infiltration systems shall be at least 10 feet from any structure. If necessary, setbacks shall be increased from the minimum 10 feet in order to maintain a 1Horizontal:1Vertical side slope for future excavation and maintenance.
- III. All infiltration systems shall be placed at least 5 feet from any property line. If necessary, setbacks shall be increased from the minimum 5 feet in order to maintain a 1Horizontal:1Vertical side slope for future excavation and maintenance.
- IV. Infiltration systems shall be setback from environmentally sensitive areas, steep slopes, landslide hazard areas, and erosion hazard areas as governed by Auburn City Code. Runoff discharged near landslide hazard areas must be evaluated by a geotechnical engineer or qualified geologist licensed in Washington State. The discharge point shall not be placed on or above slopes greater than 20% (5Horizontal:1Vertical) or above erosion hazard areas without evaluation by a geotechnical engineer or qualified geologist and City approval.
- V. Stormwater infiltration facilities shall be set back at least 100 feet from drinking water wells and springs used for public drinking water supplies. Additional measures may be necessary to comply with Health Department requirements for well head protection (Washington Wellhead Protection Program, DOH, Publication # 331-018).
- VI. For sites with septic systems, infiltration systems shall be located down slope of the primary and reserve drain field unless the site topography clearly prohibits surface flows from reaching the drain field. Stormwater infiltration facilities shall be set back at least 10 feet from septic tanks and septic drain fields. Additional setbacks from DOH publication 337-039 On-Site Sewage Systems, Chapter 246-272A WAC may apply.

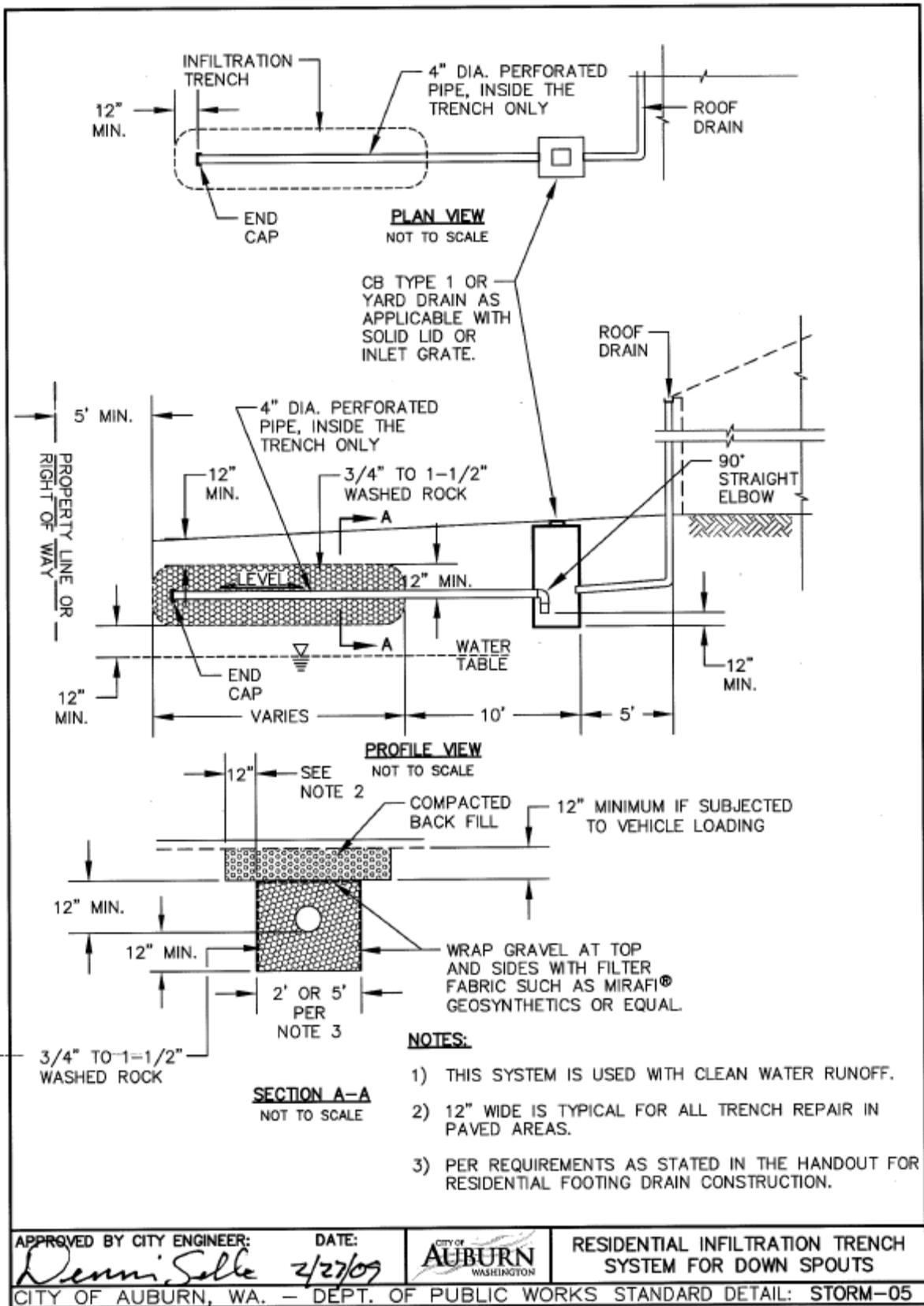


Figure 1. Typical Downspout Infiltration Trench

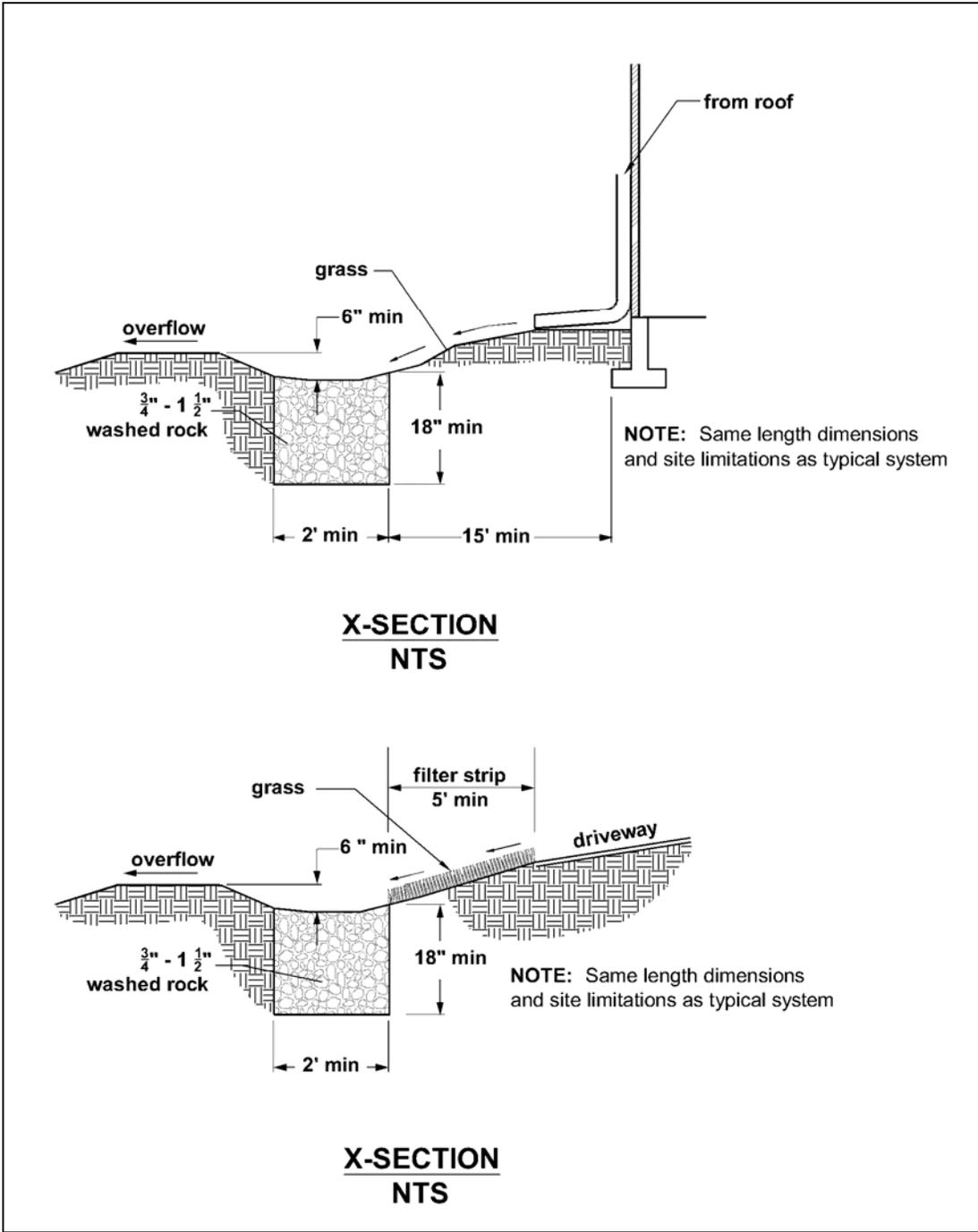


Figure 2. Alternate Downspout Infiltration Trench System for Coarse Sand and Gravel or Driveway Areas

B. Downspout Dispersion Systems

Downspout dispersion systems are dispersion trenches or splash blocks that spread roof runoff over vegetated areas. Also refer to BMP L610, Downspout Dispersion, in SWMM Volume VI.

Application

Downspout dispersion may be used on all sites that cannot infiltrate roof runoff and that meet the following design criteria.

General Design Criteria

- Downspout dispersion trenches designed as shown in Figure 4 (SWMM Figures III-2-3 and VI-2-1), attached, should be used for all downspout dispersion applications except where splash blocks are allowed.
- For sites with septic systems, dispersion systems shall be located down slope of the primary and reserve drain field unless the site topography clearly prohibits flows from reaching the drain field. All dispersion systems shall be at least 10 feet from any structure. If necessary, setbacks shall be increased from the minimum 10 feet in order to maintain a 1Horizontal:1Vertical side slope for future excavation and maintenance.
- All dispersion systems shall be placed at least 5 feet from any property line. If necessary, setbacks shall be increased from the minimum 5 feet in order to maintain a 1Horizontal:1Vertical side slope for future excavation and maintenance.
- Setback dispersion systems from environmentally sensitive areas, steep slopes, landslide hazard areas, and erosion hazard areas as governed by Auburn City Code.
- Runoff discharged towards landslide hazard areas must be evaluated by a geotechnical engineer or qualified geologist licensed in Washington State. The discharge point shall not be placed on or above slopes greater than 20% (5Horizontal:1Vertical) or above erosion hazard areas without evaluation by a geotechnical engineer or qualified geologist and City approval.
- No erosion or flooding of downstream properties may result from the use of downspout dispersion systems.

Design Criteria for Dispersion Trenches

- A vegetated flowpath of at least 25 feet in length must be maintained between the outlet of the trench and any property line, structure, stream, wetland, or impervious surface. A vegetated flowpath of at least 50 feet in length must be maintained between the outlet of the trench and any slope, 20% (5Horizontal:1Vertical) or greater. Sensitive area buffers may count towards flowpath lengths if approved by the City of Auburn.
- A 10-foot-long by 2-foot-wide gravel filled dispersion trench as shown in Figure 4, (attached) can be used for roof areas serving up to 700 square feet. For roof areas larger than 700 square feet, a proportional length of dispersion trench may be added with the installation of a notched grade board as approved by the City. A grade board is a 2" x 12" pressure treated board placed level to distribute the trench overflow, see Figure 3, attached. The total length of an individual dispersion trench must not exceed 50 feet and must provide at least 10 feet of trench length per 700 square feet of roof area.

Design Criteria for Splashblocks

A typical downspout splashblock is shown in Figure 5 (SWMM Figure VI-2-3), attached. In general, if the ground is sloped away from the foundation and there is adequate vegetation and area for effective dispersion, splashblocks will adequately disperse storm runoff. If the ground is fairly level, if the structure includes a basement, or if foundation drains are proposed, splashblocks with downspout extensions may be a better choice because the discharge point is moved away from the foundation. Downspout extensions can include piping to a splashblock/discharge point a considerable distance from the downspout, as long as the runoff can travel through a well-vegetated area as described below.

- A vegetated flow path of at least 50 feet in length shall be maintained between the discharge point and any property line, structure, steep slope, stream, wetland, lake, or other impervious surface. Environmentally sensitive area buffers may count toward flow path lengths. The minimum spacing between splash blocks shall be 10 feet.
- Flows shall not be directed onto sidewalks.
- A maximum of 700 square feet of roof area may drain to each splashblock.
- A splashblock or a pad of crushed rock (2 feet wide by 3 feet long by 6 inches deep) shall be placed at each downspout discharge point.

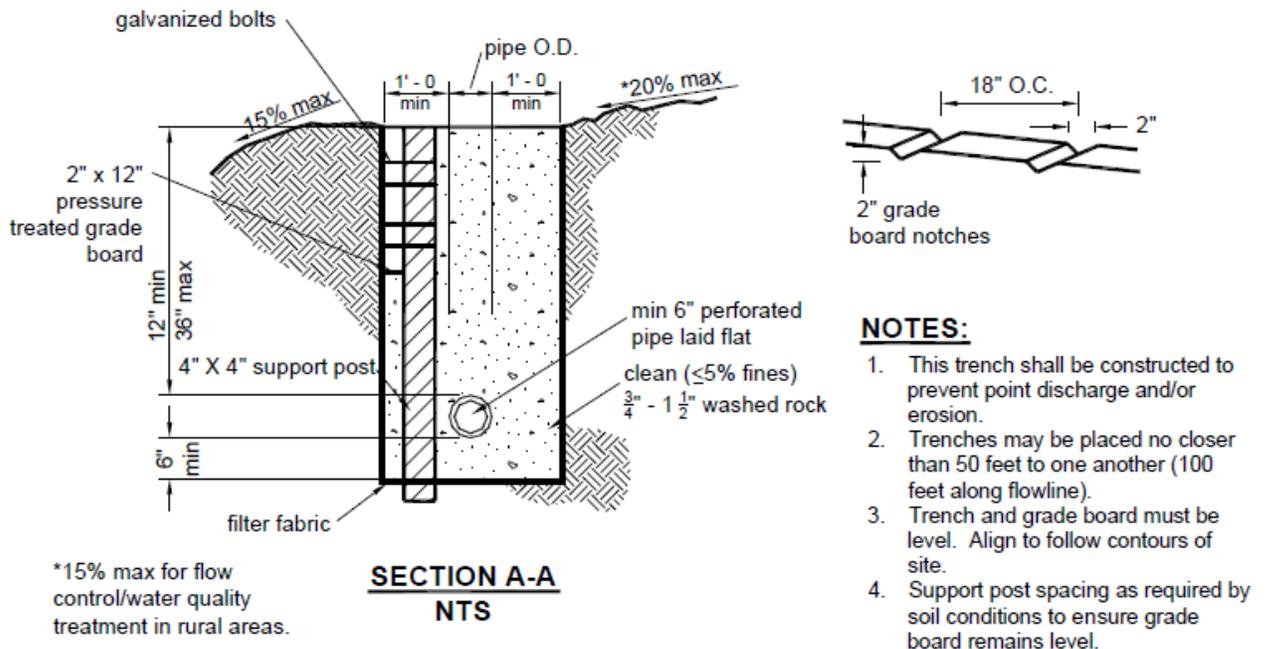


Figure 3. Typical Dispersion Trench with Notched Grade Board

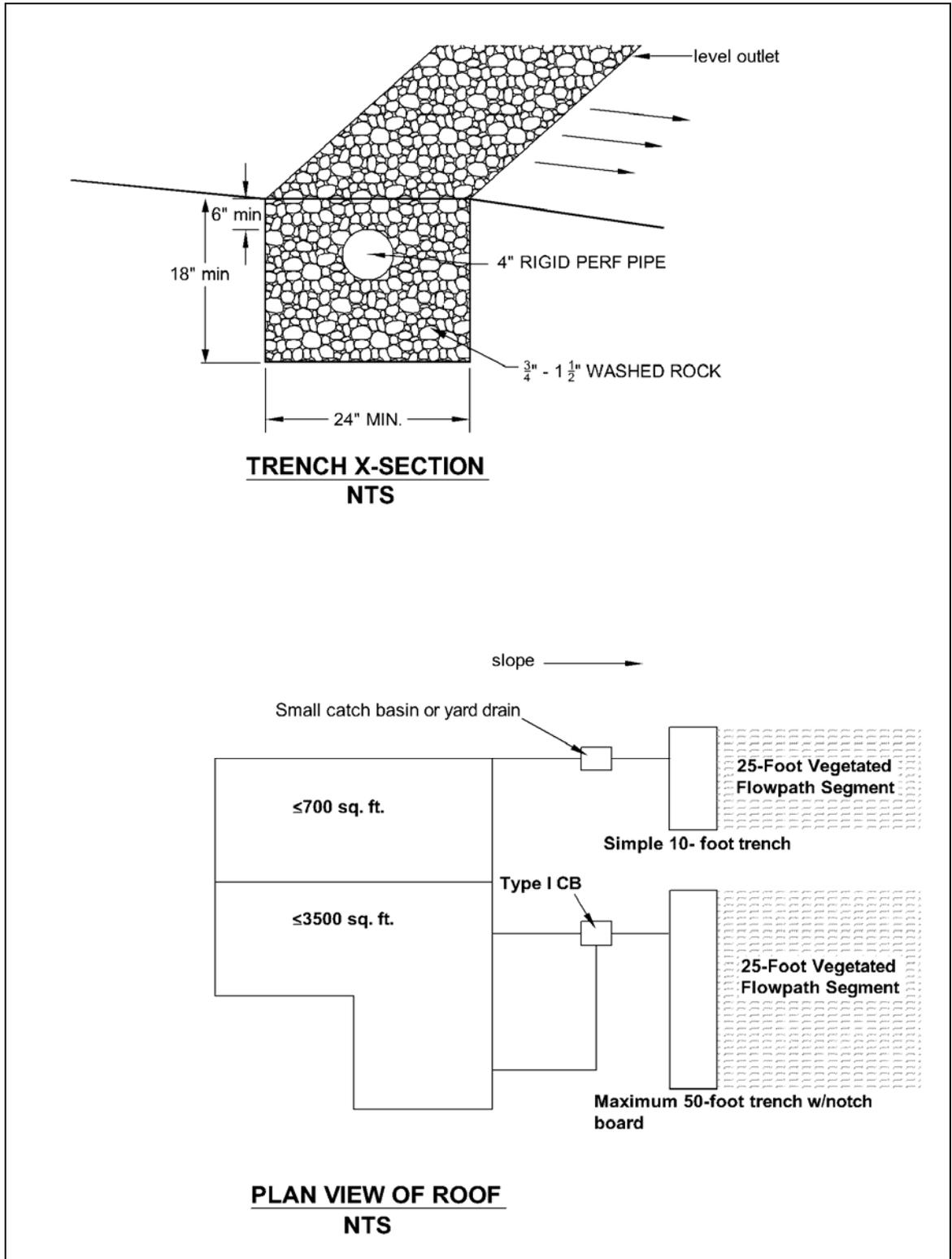


Figure 4. Typical Downspout Dispersion Trench

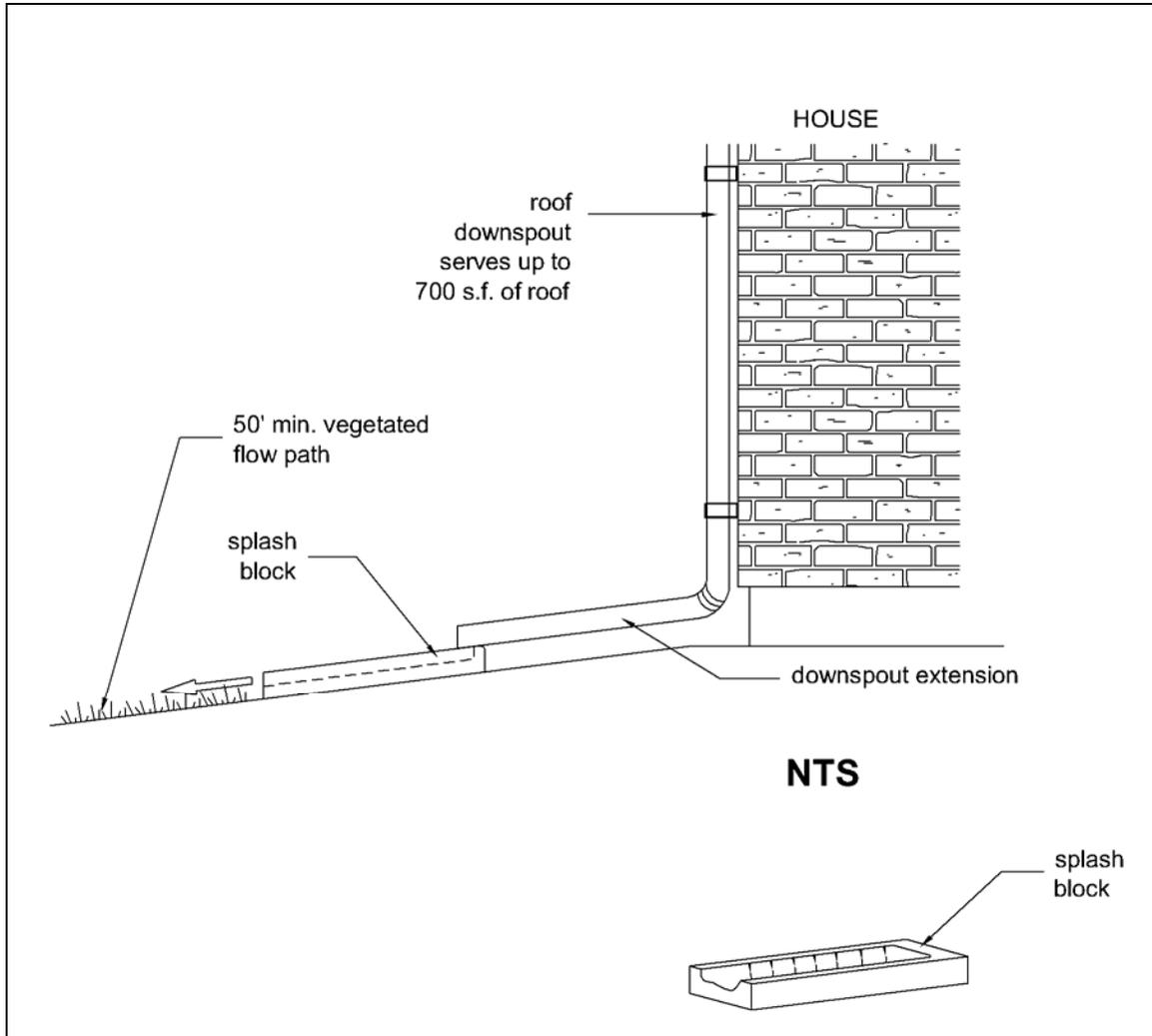


Figure 5. Typical Downspout Splashblock Dispersion

C. Collect and Convey

Where it can be demonstrated that infiltration and dispersion are not feasible for roof downspout controls, it may be allowable to collect and convey the runoff to the City stormwater system. This may be either the curb, if present, or the drainage system catchbasin or manhole.

Conveyance to the curb will only be allowed if a catch basin is located within 350 feet downstream of the discharge point and must be piped from the property line through the curb face. If a catch basin is not located within 350 feet of the discharge location, a storm main extension may be required to allow connection to the City's Storm Drainage system.

For single-family homes, the allowable pipe size for conveyance to the curb face shall be 3 inches in diameter, Figure 6, attached. As an alternative, a minimum 6 inch line shall be installed for direct connection to a City owned drainage structure.

For total roof areas 2,000 to 5,000 square feet, roof runoff may be allowed to be collected and conveyed to either the curb or directly connected to a City owned drainage structure. The runoff shall not be conveyed over driveways, sidewalks or other areas reserved for pedestrian traffic. A detail for the discharge shall be submitted to the City for review and approval prior to issuance of a storm permit.

For roof areas between 5,001 square feet and 9,999 square feet, roof runoff may be allowed to be collected and conveyed to the curb face or directly connected to a City owned drainage structure. A capacity analysis of the road gutter and City conveyance piping and catch basin will be required to ensure that adequate capacity exists. To accommodate larger roof areas, more than one connection to the City stormwater system may be allowed..

For roof areas 10,000 square feet and greater, please refer to Minimum Requirement #7 of the SWMM in Volume1, Chapter 3.

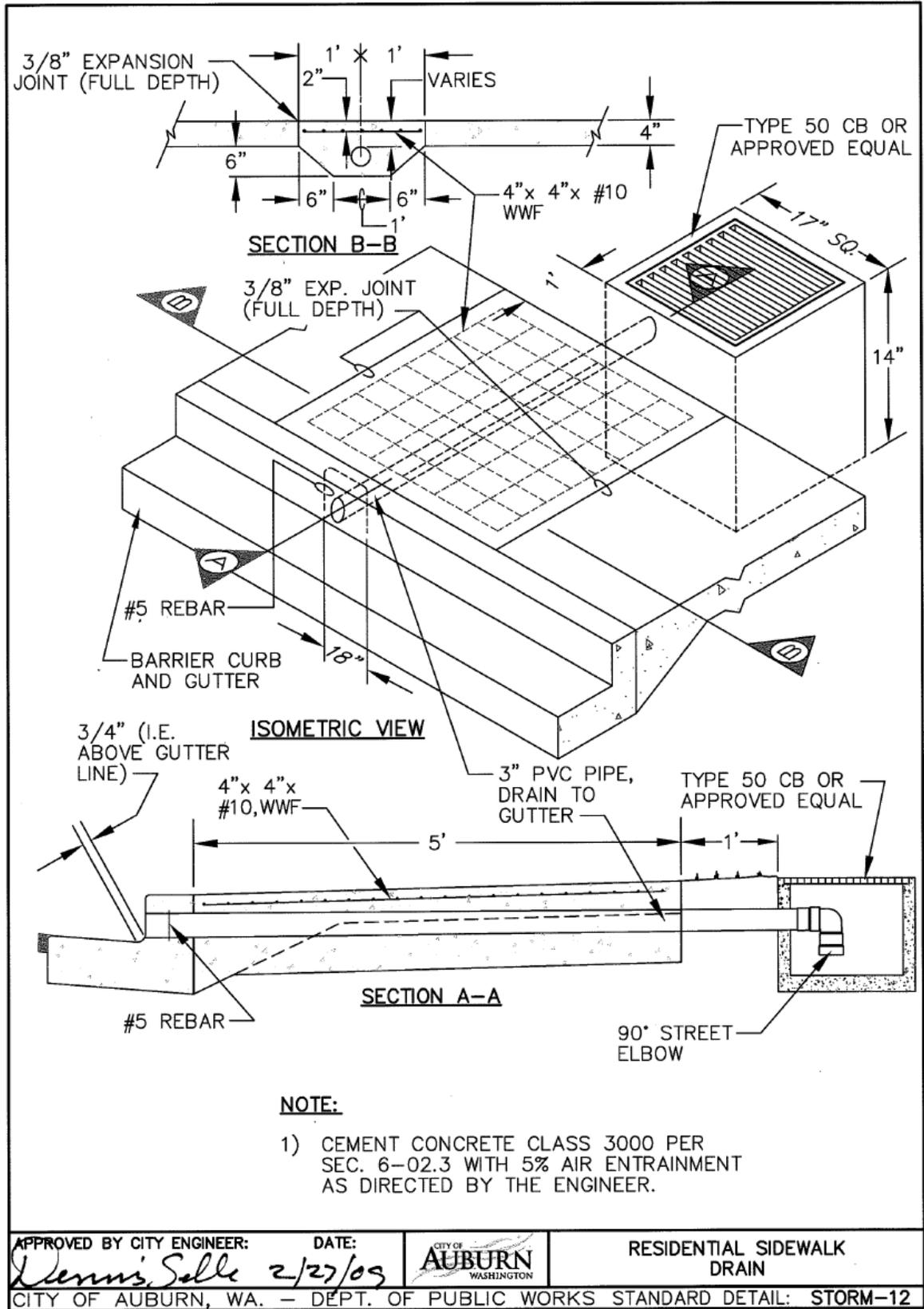
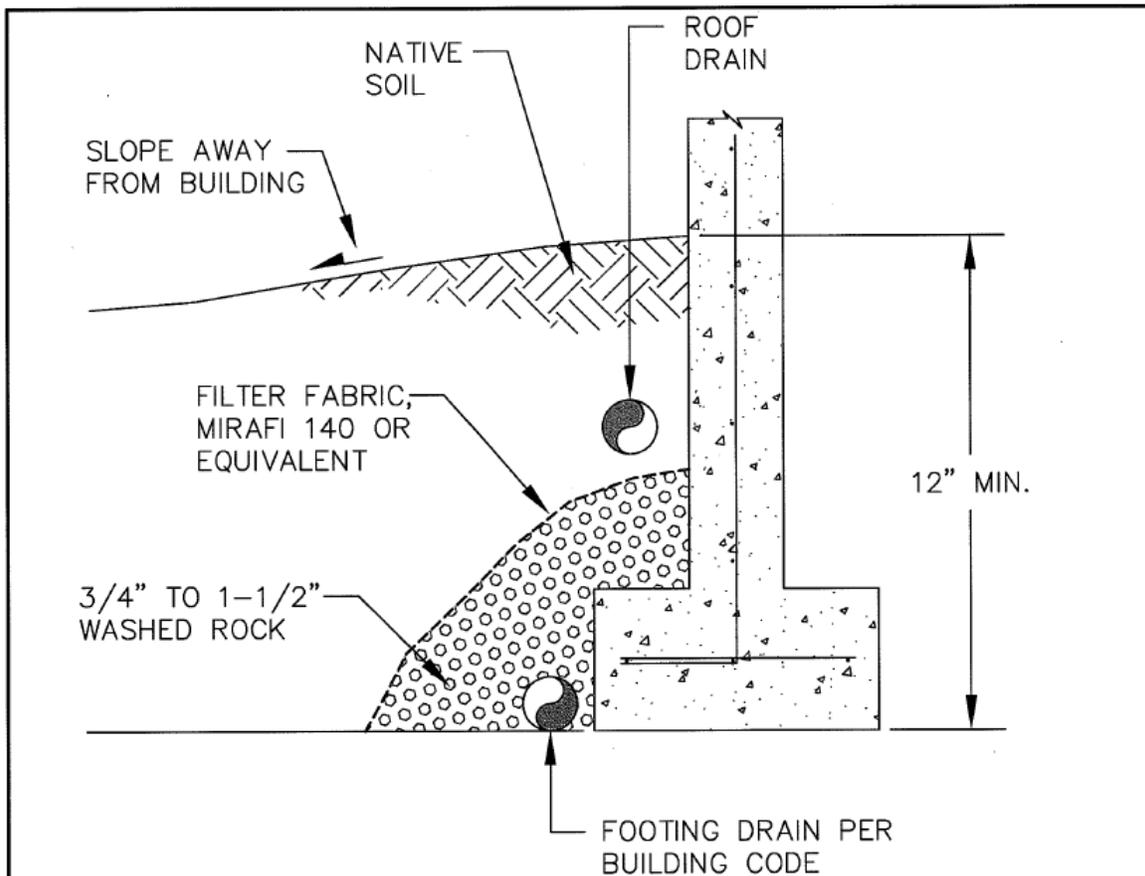


Figure 6. Conveyance to Curb Face

Residential Footing Drains

Residential footing drains should conform to the following detail.



SCHEMATIC ONLY

NOT TO SCALE

NOTES:

- 1) ROOF DRAIN SHALL BE SOLID WALL PVC (SDR-35) PIPE.
- 2) FOOTING DRAIN SHALL BE MINIMUM 4" DIA. RIGID PERFORATED OR SLOTTED PVC (SDR-35) PIPE. IT SHALL BE INSTALLED WITH SLOTS FACING DOWN.
- 3) DO NOT CONNECT ROOF DRAIN TO FOOTING DRAIN.
- 4) CONNECTIONS OF ROOF AND FOOTING DRAINS TO STORM DRAIN MAIN SHALL BE MADE A MINIMUM OF 5' HORIZONTALLY FROM THE FOOTING.
- 5) DEVIATIONS FROM THIS DETAIL SHALL BE APPROVED BY THE BUILDING INSPECTOR.

APPROVED BY CITY ENGINEER: <i>Dennis Salla</i>	DATE: <i>2/27/09</i>	CITY OF AUBURN WASHINGTON	RESIDENTIAL FOOTING DRAIN DETAIL
CITY OF AUBURN, WA. — DEPT. OF PUBLIC WORKS STANDARD DETAIL: STORM-07			