STORMWATER SPECIAL DISTRICT STANDARDS

Section 221, Chapter 2 Stormwater Management

STORMWATER STANDARDS
FOR SINGLE FAMILY
RESIDENCES AND DUPLEXES
ON EXISTING LOTS

May 20, 2002
FINAL

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SECTION 1: INTRODUCTION

1.1 PURPOSE

In areas designated as Stormwater Special Districts, permanent on-site stormwater quality and quantity facilities shall be required on lots less than five acres in size for projects that meet either of the following criteria:

- New construction or remodels that increase impervious surfaces by more than 500 square feet; or
- Renovation projects where the estimated cost of the work exceeds 50% of the assessed value of the existing structure

If stormwater quality and quantify facilities required based on either of these criteria, these standards shall apply to the entire property, unless it can be demonstrated that off-site facilities would provide better treatment, or unless common detention and water quality facilities meeting the standards of the 1996 Whatcom County Development Standards or the 1992 Department of Ecology Stormwater Management Manual for the Puget Sound Basin (or more current versions) have been approved as part of a comprehensive stormwater management plan for that subdivision, short subdivision or binding site plan approval.

1.2 BACKGROUND

On undeveloped land, most precipitation infiltrates into the ground and flows slowly to nearby lakes and streams through the upper layers of soil. When that same area is cleared or covered with an impervious surface, the rainwater is not captured by vegetation and forest duff, but flows quickly across the site and through pipes and channels to lakes or streams. The total amount of surface runoff from the site is increased, and when combined with uncontrolled runoff from other sites, can overflow the pipes and channels that carry it. This can result in flooding and erosion of downstream properties. Larger developments address this problem by collecting runoff from the developed site in retention/detention systems including ponds, vaults or tanks. Water is then released slowly so as not to exceed the capacity of downstream conveyance systems. Controlling flows from small sites (less than 5 acres) is just as important as for large developments, because the cumulative effect of uncontrolled flows from many small sites can be equivalent to those from a large site. For some small sites, however, retention/detention systems may not be warranted, since the natural storage capacity of soils and vegetation can be used to effectively slow and filter runoff.

In some cases, proposed stormwater management techniques are simple enough so that general minimum standard requirements may replace specific engineering analysis and unique design solutions. These standards describe systems that can be used for individual lots in controlling and treating stormwater runoff. The following standards for Stormwater Special Districts represent the mandatory minimum requirements that Whatcom County will accept without additional, design specific, engineering analysis.

Note: Projects that cannot comply with or elect not to use these standards and projects where Whatcom County determines that these standards will not adequately protect the downstream drainage systems and receiving waters will be required to submit engineering plans. Engineering plans include: site improvement plans, erosion control plans, and a stormwater design report to be signed and stamped by a professional engineer registered in the State of

Washington to address drainage issues not covered by these standards. In many cases, an engineering analysis will demonstrate a more innovative, appropriate and economic size or type of stormwater facility.

1.3 REGULATORY AUTHORITY (TITLE 20.80.634 WCC)

The authority for this chapter is derived from Title 20, Whatcom County Zoning Ordinance, 20.80.634 through 20.80.636.

1.4 REQUIREMENTS APPLICABLE TO INDIVIDUAL PROJECTS

Drawing 1.4 illustrates the review process by which requirements for individual projects are determined. Additional information and background is provided in the referenced sections for each step of the decision process.

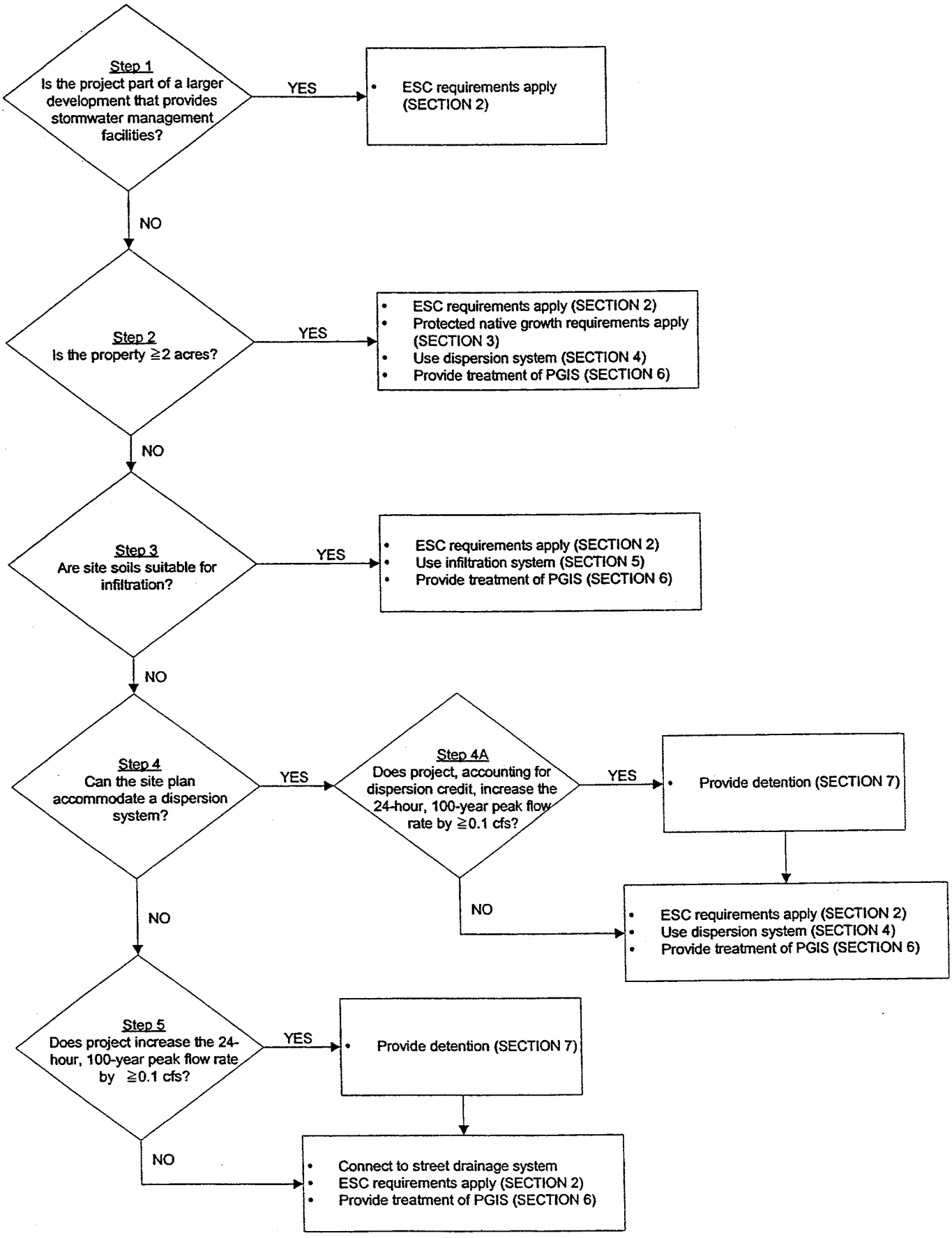
Property owners shall maintain in perpetuity all stormwater facilities constructed to meet the requirements of these standards. Furthermore, the location of stormwater facilities and Protected Native Growth Area (if applicable) shall be shown on a site plan and recorded with the Whatcom County Auditor's Office along with any separate covenants related to said site plan (see Appendix A).

1.5 SUBMITTAL REQUIREMENTS

Prior to any clearing or grading activities, a site plan must be submitted to County review staff. An example site plan is shown in Drawing 1.5. Information required on the site plan is as follows:

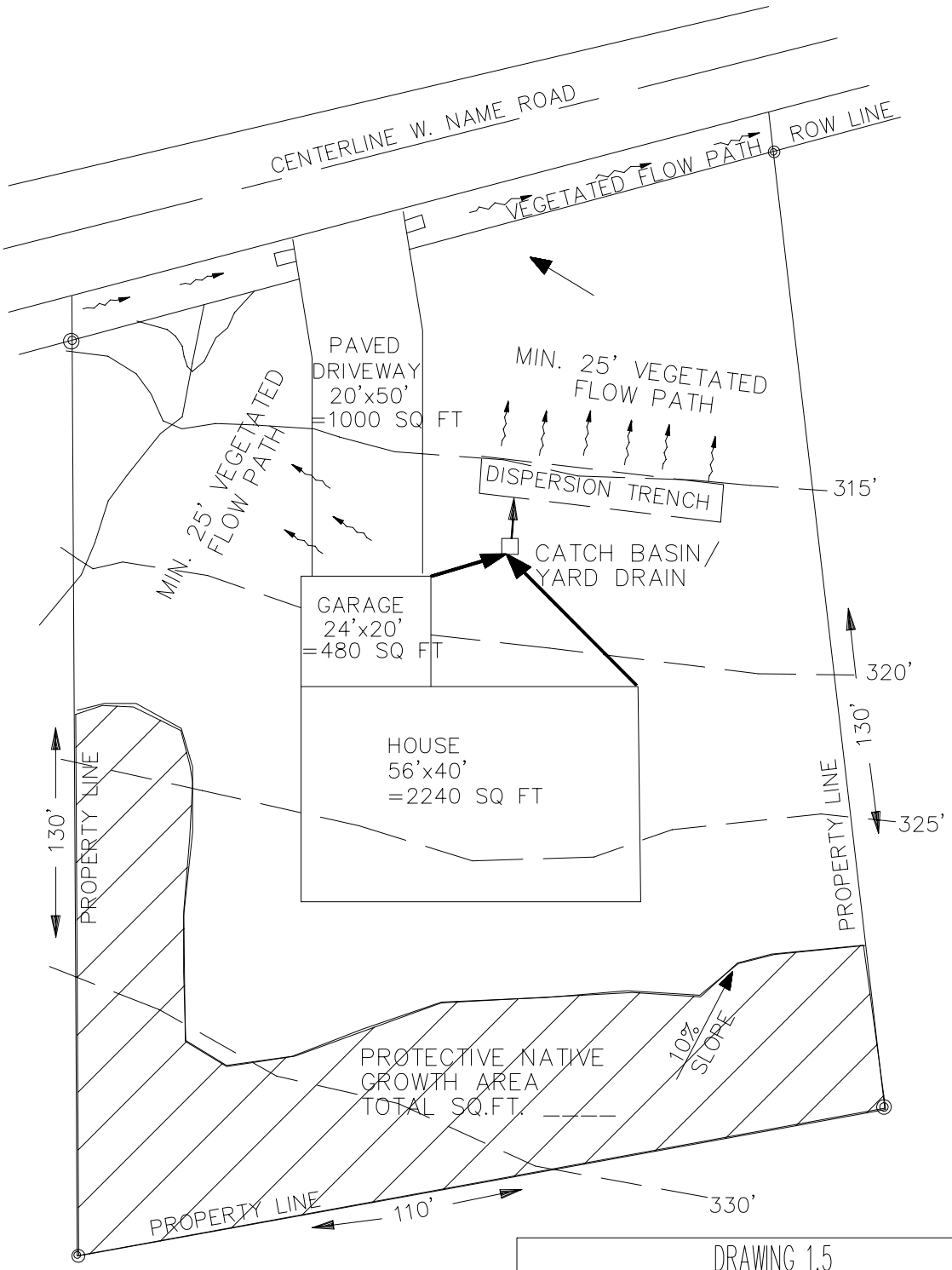
- Applicant name
- Applicant contact address
- Project address (if different)
- Contact phone number
- Assessor parcel number
- Parcel size
- Total proposed area of impervious surface
- Sketch of site, showing the following items:
    - Location of all existing and proposed structures, driveways, walkways, and patios
    - Lot dimensions
    - Location of property lines
    - Approximate slope and topography of site
    - Location of any critical areas (wetlands, streams, ponds, steep slopes, shorelines)
    - Name of and distance to access street(s)
    - Approximate distance to existing structures on neighboring properties
    - Location and type of proposed stormwater management facilities

In addition to the site plan, a Small Site Erosion and Sediment Control (ESC) Plan is required prior to any clearing or grading activities. Requirements for the Small Site ESC Plan are detailed in Section 2.3.



Drawing 1.4: Flowchart for determining small site stormwater requirements

APPLICANT:
NAME _____ ASSESSOR PARCEL# _____
ADDRESS _____ PROJECT ADDRESS _____
_____ (if different) _____
PHONE# _____ PARCEL SIZE _____ TOTAL IMPERVIOUS AREA _____



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DRAWING 1.5

SINGLE FAMILY RESIDENCE
SITE DRAINAGE PLAN

WHATCOM COUNTY DEPARTMENT OF PUBLIC WORKS

SECTION 2: EROSION & SEDIMENT CONTROL

2.1 BACKGROUND

All sites, including small sites, are required to use erosion and sediment control (ESC) Best Management Practices (BMPs) to prevent onsite soils and sediment-laden runoff from leaving the site during and after construction. Temporary erosion and sediment control (TESC) BMPs prevent soil erosion during development of the site. Small site ESC concentrates on TESC because landscaping usually stabilizes the site after construction. For sites that are not landscaped, permanent ESC measures are required.

TESC is required because soils eroded from the site are deposited downstream in pipes, streams, or lakes. Soils deposited in a pipe or channel reduces its capacity to convey flows, and can increase the likelihood of flooding. Soils in streams can also clog the gravels that salmon use for spawning. Nutrients associated with soils that reach lakes can upset the chemical balance of the lake, causing excessive growth of algae, milfoil, and other plants, and decreasing recreational uses such as swimming, boating, and fishing.

It is the responsibility of both the applicant and contractor to prevent the erosion and transport of sediment to the greatest extent possible. Erosion control measures shall be used both during and after construction.

2.2 REQUIRED ESC MEASURES

Temporary Erosion and Sediment Control (TESC) measures are used during construction to minimize the amount of sediment mobilized and trap any mobilized sediment before it leaves the site. Examples of temporary erosion controls include the use of mulches or other cover materials, marked/minimized clearing limits, and routing of water around exposed soils. Installation and maintenance of silt fencing is an example of sediment trapping.

The following measures will be required on small sites in order to minimize onsite erosion and prevent mobilized sediment from leaving the site:

- Rock construction entrance
- Mulching
- Minimized clearing
- Silt fencing
- Winter stabilization
- Check dams

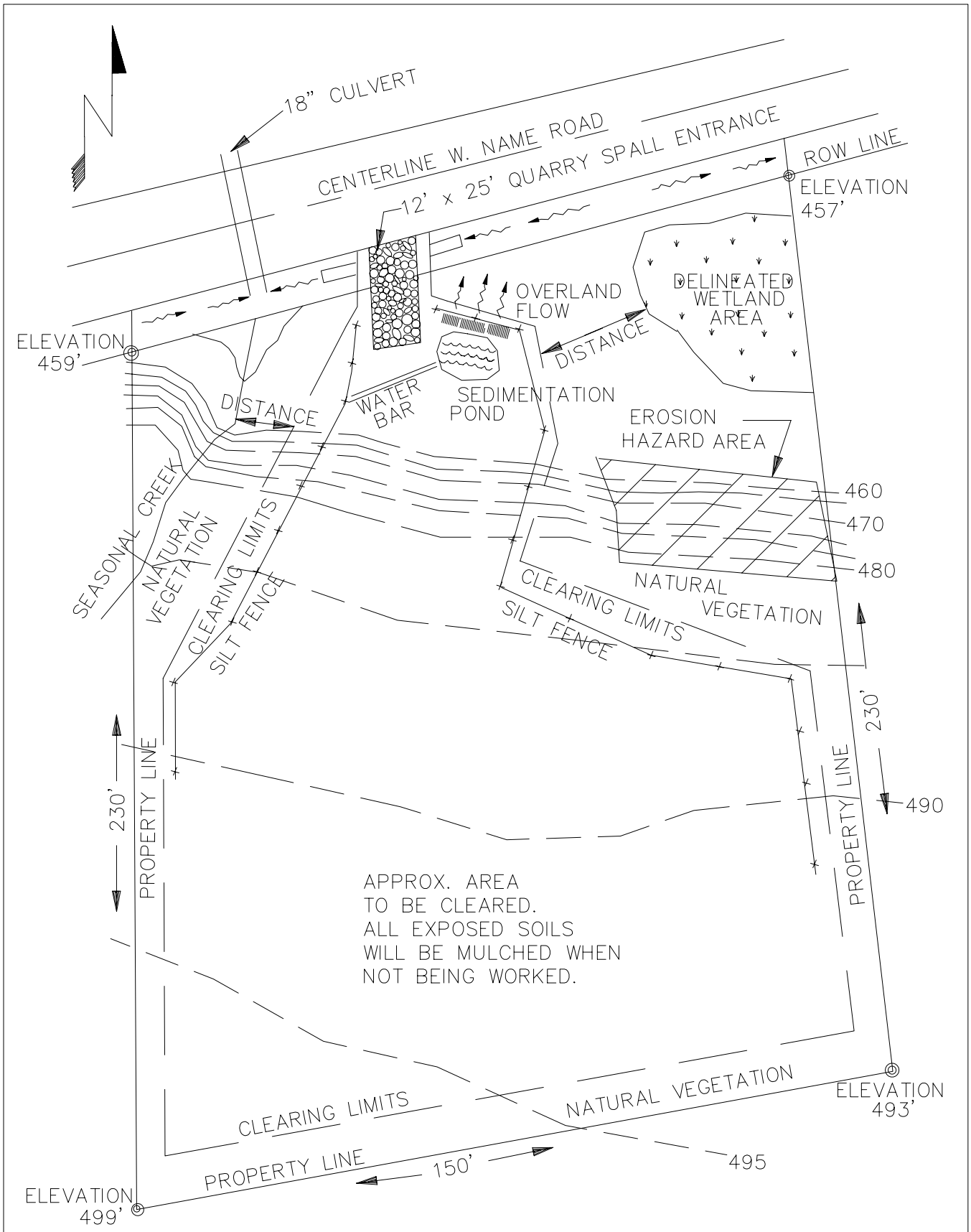
Typically, combinations of all of the above BMPs are required during construction, unless specific site conditions exist which make a particular BMP unnecessary, as determined by County review staff. Other sediment control measures may be allowed or required if these are inappropriate for the project or fail to contain sediment on the project site. A description of other measures and more detailed descriptions of those included here can be found in the DOE Stormwater Management Manual for Western Washington.

Permanent Erosion and Sediment Control (final stabilization) measures are used to stabilize the site at the end of construction. Examples of permanent ESC measures include landscaping, mulching, and seeding.

2.3 SUBMITTAL REQUIREMENTS

Prior to any clearing or grading activity, the applicant must submit a Small Site Erosion and Sediment Control Plan. An example Small Site ESC Plan is provided in Drawing 2.3. The following information is required on the plan:

- Applicant name
- Project address
- Contact phone number
- Assessor parcel number
- Parcel size
- Sketch of site, showing the following items:
    - Lot dimensions
    - Location of property lines
    - Approximate slope and topography of site
    - Location of any critical areas (wetlands, streams, ponds, steep slopes, shorelines)
    - Name of and distance to access street(s)
    - Location of all proposed ESC measures
    - Proposed limits of clearing
    - Location of native vegetation areas not to be disturbed
    - Proposed location for temporary storage of excavated material



APPLICANT NAME _____

PARCEL NO. _____

SITE ADDRESS _____

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DRAWING 2.3

SMALL SITE

EROSION & SEDIMENT CONTROL PLAN

WHATCOM COUNTY DEPARTMENT OF PUBLIC WORKS

SECTION 3: PROTECTED NATIVE GROWTH AREA (PNGA) 2 ACRE TO LESS THAN 5 ACRE PARCELS

The preservation of forested cover in watersheds is important for protecting the quality of natural stream systems. Forested and native growth areas allow rainwater to naturally percolate into the soil, recharging groundwater for summer stream flows and lessening increases of surface water that create erosion and flooding. Forested and native growth areas also may be effective as stormwater buffers around smaller developments. Preserving 65% or more of the site as native growth, preferably forested, and utilizing dispersion BMPs can achieve an equivalent level of protection for streams achieved without constructing engineered stormwater facilities (King County Surface Water Design Manual, 1998). The maximum allowable clearing for PNGA lots is 35%[1] of the site. The remainder of the site must be preserved as Protected Native Growth Area subject to the following criteria and conditions:

1. The Protected Native Growth Area shall include areas on the site containing plant species including but not limited to those listed on Whatcom County's Approved Native Plant List (see appendix C). Those portions of the site that are currently cleared (not in violation of Whatcom County Code) may be excluded from the Protected Native Growth Area requirements. However, no additional clearing may be performed on the site that will result in the maximum clearing allowance being exceeded, except as approved by Whatcom County in conjunction with a revegetation plan for an equivalent area of existing clearing. Projects that propose to clear in excess of this threshold will be subject to Full Stormwater Review.

2. The native growth retention area must be protected through a recorded Protected Native Growth Site Plan and covenant on individual lots. An example Protected Native Growth Area covenant is located in Appendix A.

3. Established by recorded site plan and covenant on individual lots, the PNGA must be shown on the small site drainage plan and described in recorded documents as "a Protected Native Growth Area established for purposes of dispersing and treating stormwater flows."

4. The principle restriction on PNGA is removal of vegetation and trees. If feasible, the open space should be located down slope from the building sites, since flow control and water quality is enhanced by flow dispersion through duff, undisturbed soils, and native vegetation.

5. The PNGA may include onsite critical areas; allowable uses shall be limited to those specified in WCC 16.16.

6. All vegetation within the PNGA at the time of permit application shall be retained, aside from approved timber harvest activities and the removal of dangerous and diseased trees. If the site is located within an area of mandatory clearing limits and has been illegally cleared; a restoration plan may be required.

[1] Projects requiring geotechnical review may be subject to increased open space as needed to provide increased protection for landslide hazard areas or other sensitive slopes.

7. The PNGA shall be shown on all property maps and shall be clearly marked during clearing and construction on the lots.

8. The PNGA may contain utilities and utility casements, including flow control BMPs.

9. Roof downspout dispersion and driveway dispersion must be provided as described in this text. A note conditioning future single-family residential building permits on compliance with these standards shall be recorded with all plats.

10. At the discretion of Whatcom County review staff, PNGA restrictions may be removed to accommodate future development provided drainage review evaluates the requirements for stormwater facilities (flow control and water quality) according to regulations in effect at the time of future application.

SECTION 4: DISPERSION

Dispersion is the simplest and least expensive small site flow control BMP. Flows concentrate when gutters, ditches or pipes collect and funnel runoff to a single discharge point. Methods such as splashblocks, rockpads and dispersion trenches can disperse these flows. Dispersed flows travel slowly through vegetation and upper soil layers, slowing runoff rates and providing water quality benefits.

Section 6 of these standards requires that all runoff from pollution-generating impervious surfaces, such as driveways, be treated. In most cases, a properly constructed dispersion system from a driveway can meet the treatment requirements of Section 6 by dispersing runoff into a vegetated area.

Note: Dispersion BMPs may not be placed on or above slopes greater than 20% without evaluation and approval by a geotechnical engineer or qualified geologist. Any proposed small site BMP within 50 feet of a slope greater than 20% may be subject to geotechnical review.

4.1 SPLASHBLOCKS

Splashblocks are the simplest way to disperse flows from a roof area. Downspout splashblocks or downspout/drain extensions with splashblocks are often the only hardware required for this type of system.

Typical Uses: Roof downspouts.

4.1.1 Design Specifications

Drawing 4.1.1 provides details of a roof downspout and splashblock. 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.

The following conditions must be met to use splashblocks:

- A splashblock or a pad of rock (2 feet wide by 3 feet long by 6 inches deep) shall be placed at each downspout discharge point.
- A vegetated flowpath[2] of at least 50 feet must be maintained between the discharge point and any property line, structure, steep slope, stream, wetland, lake, or other impervious surface. Critical area buffers may count toward flowpath lengths.
- A maximum of 700 square feet of roof area may drain to each splashblock.

[2] The vegetated flowpath must be covered with well-established lawn or pasture, landscaping with well-established groundcover, or native vegetation with natural groundcover. The groundcover shall be dense enough to help disperse and infiltrate flows and to prevent erosion.

- Runoff discharged towards landslide hazard areas must be evaluated by a geotechnical engineer or qualified geologist. Splashblocks may not be placed on or above slopes greater than 20% or above erosion hazard areas without evaluation by a geotechnical engineer or qualified geologist and Whatcom County approval.
- For sites with septic systems, the discharge point must be down slope of the primary and reserve drainfield areas. Whatcom County permit review staff can waive this requirement based on evaluation by a geotechnical engineer or qualified geologist.

4.2 DISPERSION OF CONCENTRATED FLOWS THROUGH VEGETATION

Concentrated flow dispersion can also be used with steep driveways. Drawing 4.2.1 shows two possible ways of spreading flows from steep driveways.

Typical Uses: Steep rural driveways, and any situation where concentrated flows can be dispersed through vegetation.

4.2.1 Design Specifications

The following conditions must be met to use dispersion of concentrated flows through vegetation:

- A vegetated flowpath of at least 50 feet, as illustrated in Drawing 4.2.1 must be maintained between the discharge point and any property line, structure, steep slope, stream, lake, wetland, lake or other impervious surface. Sensitive area buffers may count toward flowpath lengths.
- A maximum of 700 square feet of impervious area may drain to each dispersion BMP.
- A pad of crushed rock (2 feet wide by 3 feet long by 6 inches deep) shall be placed at each discharge point.
- A geotechnical engineer or qualified geologist must evaluate runoff for sites with septic systems, the discharge point must be downgradient of the drainfield primary and reserve areas. This requirement can be waived by Whatcom County permit review staff if site topography clearly prohibits flows from intersecting the drainfield.

4.3 DISPERSION TRENCHES

Where dispersion of concentrated flows through 50 feet of vegetation is not feasible, such as on a small or highly constrained site, a dispersion trench may be used. Dispersion trenches provide some storage for runoff, promote infiltration, and spread concentrated flows so that a shorter vegetated path length can be used at the trench outlet. This BMP is more expensive than the simple dispersion systems described above, and must be carefully constructed to be effective.

Typical Uses: Roof downspouts, steep driveways, or any situation where flows are concentrated but where dispersion through vegetation (previous section) is not feasible.

4.3.1 Design Specifications

Drawing 4.3.1.A provides details for dispersion trenches. In addition, the following requirements must be met:

- 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 steep slope. Sensitive area buffers may count towards flowpath lengths.

- Each trench can serve up to 700 square feet of impervious area. For larger impervious areas, trenches can be at a ratio of 10 feet of trench per 700 square feet of impervious area. Drawing 4.3.1.B provides alternate trench construction requirements for areas where there is potential for erosion.
- A setback of at least 5 feet must be maintained between any edge of the trench and any structure or property line.
- Runoff discharged towards landslide hazard areas must be evaluated by a geotechnical engineer or qualified geologist. The discharge point may not be placed on or above slopes greater than 20% or above erosion hazard areas without evaluation by a geotechnical engineer or qualified geologist and Whatcom County approval.
- For sites with septic systems, the discharge point must be downgradient of the drainfield primary and reserve areas. Whatcom County permit review staff can waive this requirement based on evaluation by a geotechnical engineer or qualified geologist.

4.4 SHEET FLOW DISPERSION

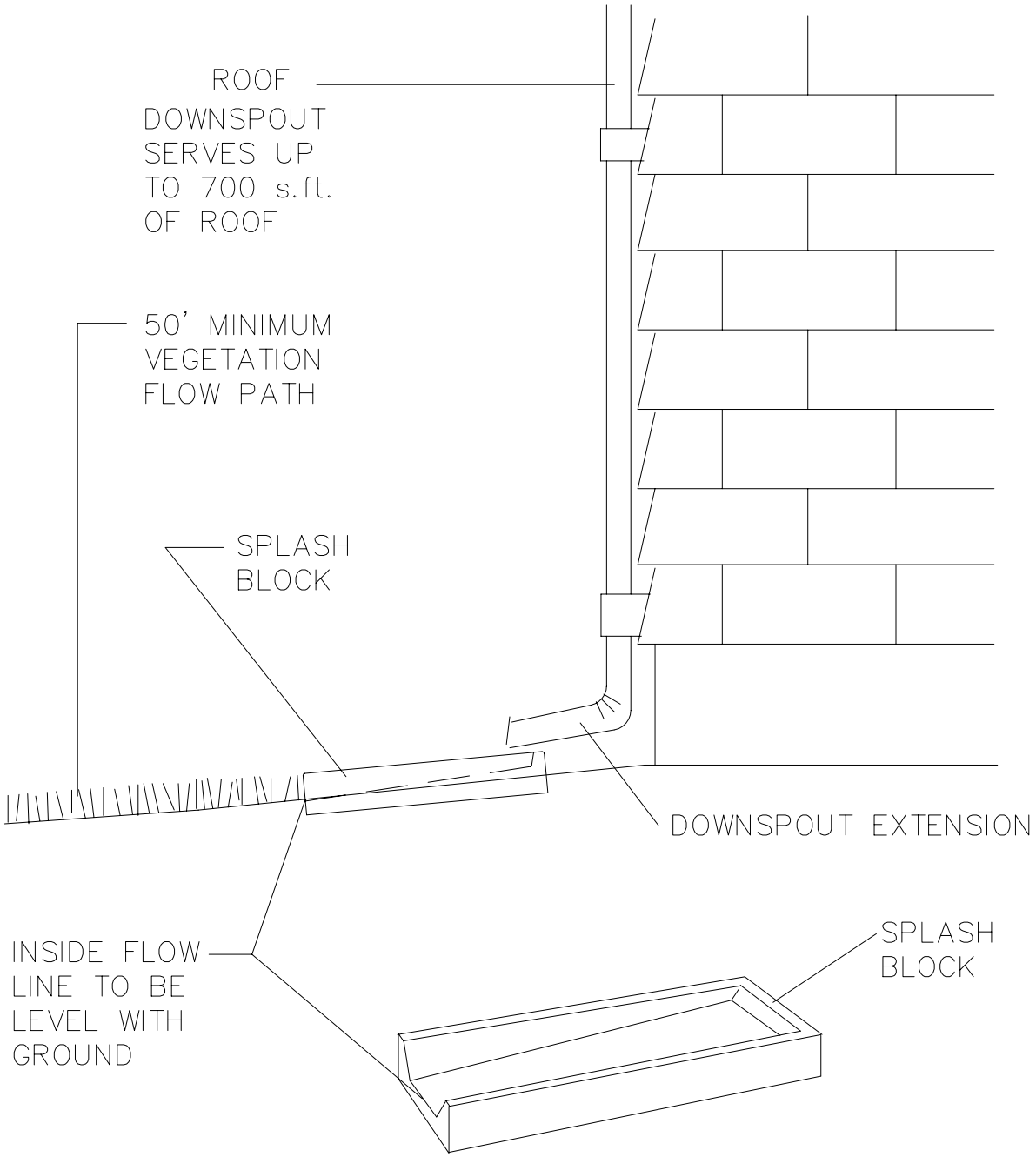
Sheet flow dispersion can be used for any impervious surface that is graded so as to avoid concentrating flows. Because flows are already dispersed as they leave the impervious surface, they need only traverse a narrow band of adjacent vegetation for effective attenuation.

Typical Uses: Flat or moderately sloping surfaces (<15% slope) such as driveways, sport courts, patios, and roofs without gutters; or any situation where concentration of flows can be avoided.

4.4.1 Design Specifications

Drawing 4.4.1 and the following guidelines apply to surfaces graded to avoid concentrating runoff:

- A 2-foot-wide transition zone to discourage channeling should be provided between the edge of the driveway pavement and the down slope vegetation, or under building eaves. This may be an extension of subgrade material (crushed rock), modular pavement, drain rock, or other material acceptable to Whatcom County.
- A vegetated buffer at least 10 feet wide must be provided adjacent to the impervious surface. If the width of the impervious surface exceeds 20 feet, the buffer must be increased to 25 feet wide.
- Runoff discharge toward landslide hazard areas must be evaluated by a geotechnical engineer or a qualified geologist. The discharge point may not be placed on or above slopes greater than 20% or above erosion hazard areas without evaluation by a geotechnical engineer or qualified geologist and Whatcom County approval.
- For sites with septic systems, the discharge point must be downgradient of the drainfield primary and reserve areas. Whatcom County permit review staff can waive this requirement based on evaluation by a geotechnical engineer or qualified geologist.



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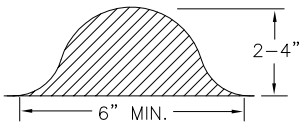
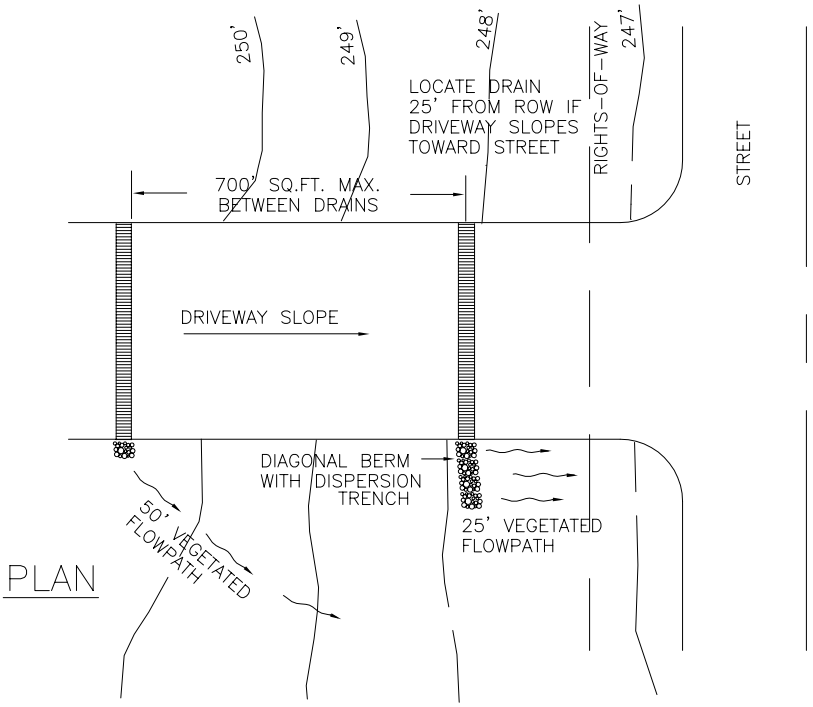
DRAWING 4.1.1
TYPICAL ROOF DOWNSPOUT SPLASHBLOCK DISPERSION
WHATCOM COUNTY DEPARTMENT OF PUBLIC WORKS



BERM DETAIL

STEEP DRIVEWAY WITH DIAGONAL BERMS



STEEP DRIVEWAY WITH SLOTTED DRAINS

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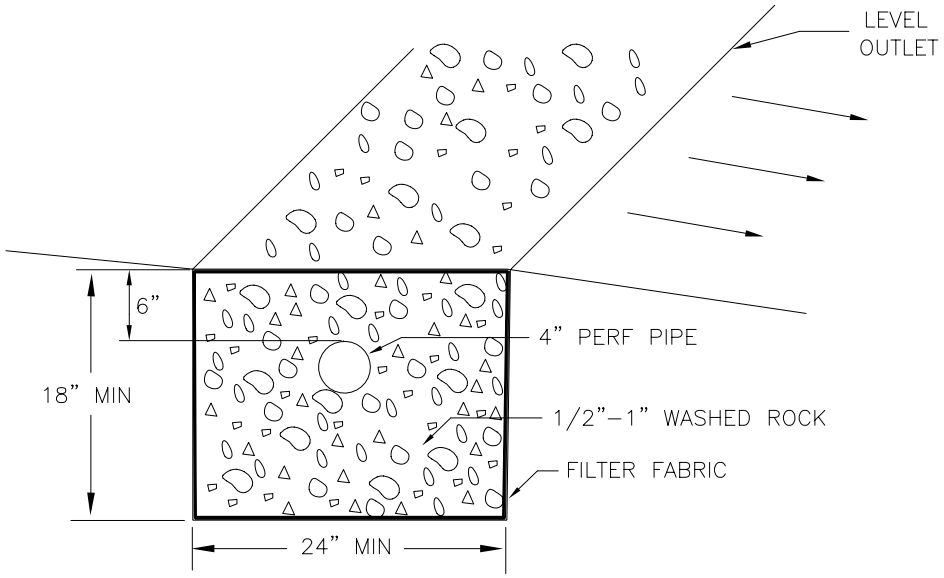
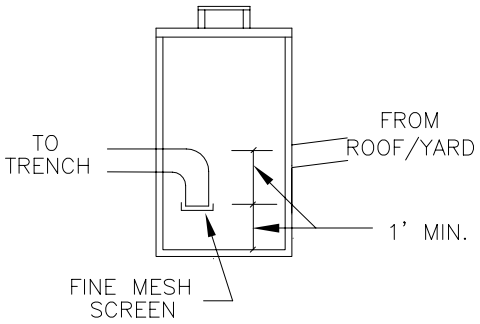
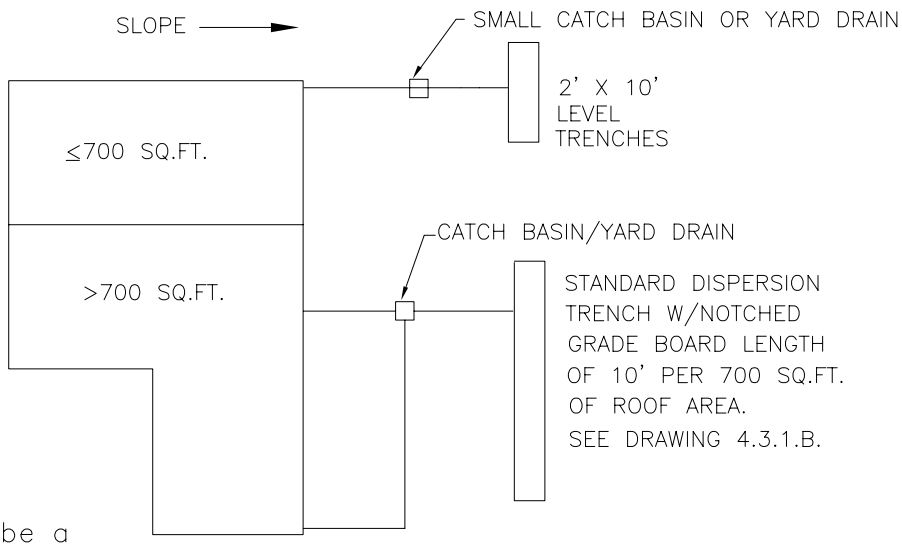
DRAWING 4.2.1
TYPICAL DISPERSION FOR STEEP DRIVEWAYS
WHATCOM COUNTY DEPARTMENT OF PUBLIC WORKS



TRENCH CROSS SECTION



CATCH BASIN/
YARD DRAIN

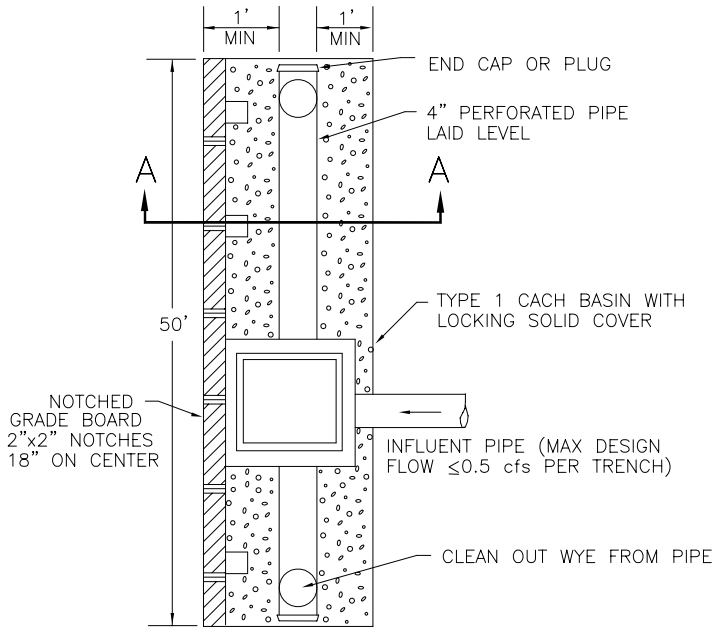


PLAN VIEW OF ROOF

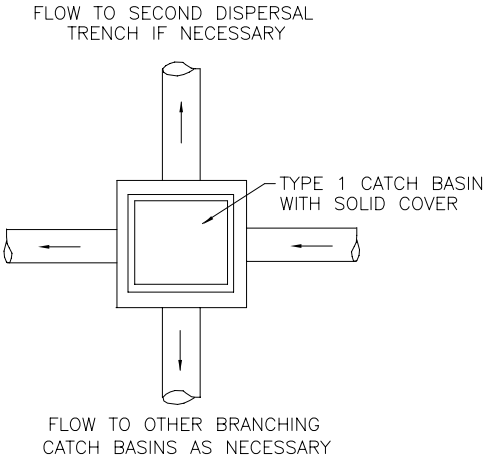
NOTE:
1. The flow path shall be a minimum of 25' from any property line, stream, wetland, structure, or hard surface.
2. At least 5' must be maintained from edge of trench and any structure or property line.

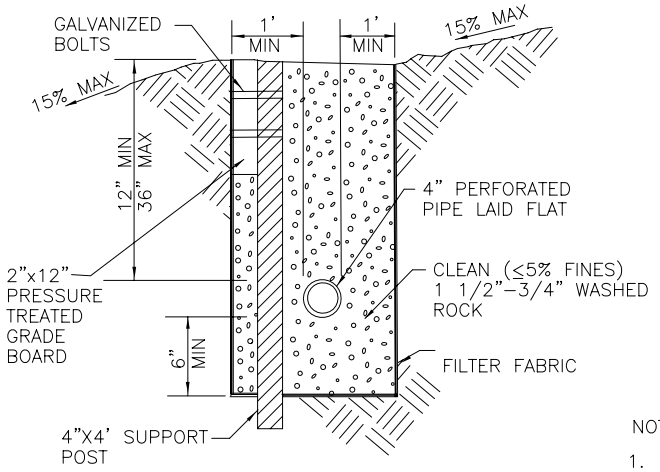
Not to Scale

DRAWING 4.3.1.A
TYPICAL DOWNSPOUT DISPERSION TRENCH
WHATCOM COUNTY DEPARTMENT OF PUBLIC WORKS

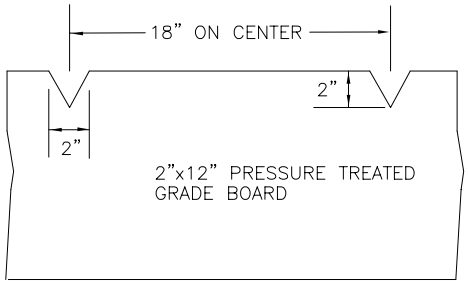


PLAN





SECTION A–A



NOTES:

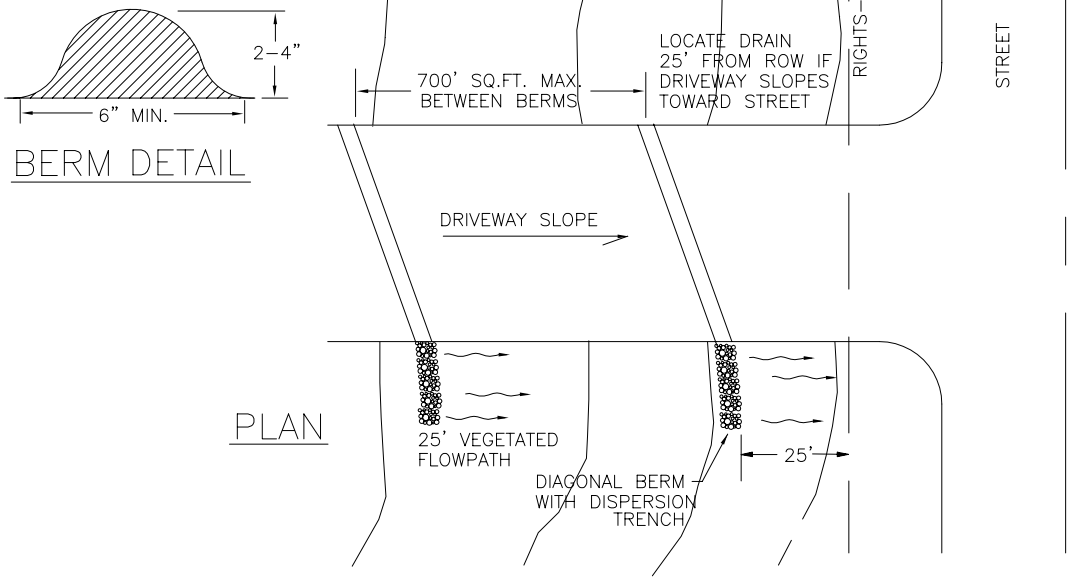
1. This trench shall be constructed so as to prevent point discharge and/or erosion.
2. Treches may be placed no closer than 50 feet to one another. (100 feet along flowline)
3. Trench and grade board must be level. Align to follow contours of site.
4. Support post spacing as required by soil conditionsto ensure grade board remains level.

Not to Scale

DRAWING 4.3.1.B

FLOW DISPERSAL TRENCH

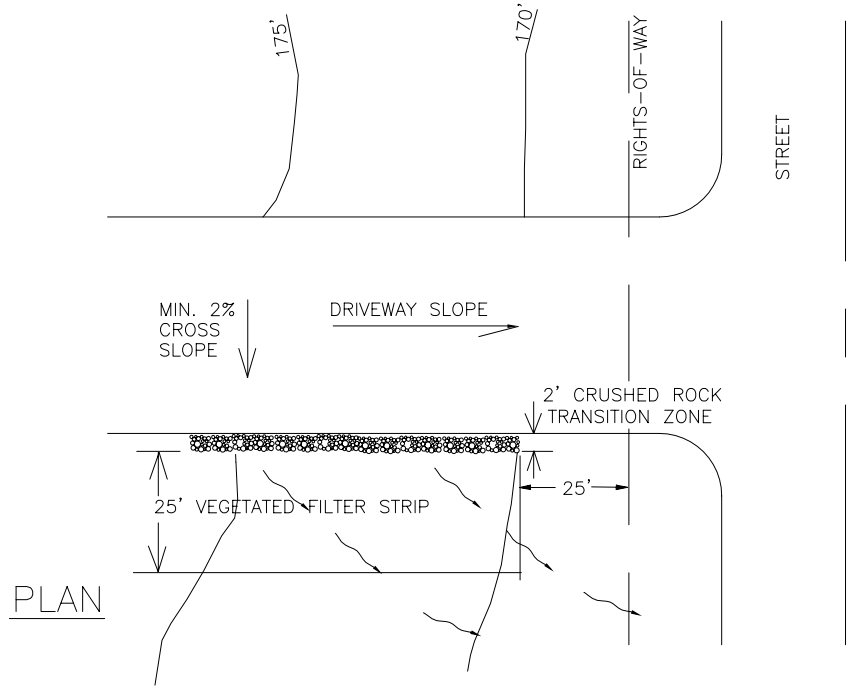
WHATCOM COUNTY DEPARTMENT OF PUBLIC WORKS



BERM DETAIL

PLAN

DRIVEWAY DISPERSION TRENCH
DRIVEWAY SLOPE VARIES AND SLOPES TOWARD STREET



PLAN

SHEET FLOW DISPERSION FROM A DRIVEWAY
FLAT TO MODERATELY SLOPING DRIVEWAYS

Not to Scale

DRAWING 4.4.1
TYPICAL FLOW DISPERSION FOR DRIVEWAYS
WHATCOM COUNTY DEPARTMENT OF PUBLIC WORKS

SECTION 5: INFILTRATION

If soils are appropriate, either infiltration trenches or drywells must be used for flow control on lots smaller than 2 acres. Stormwater must be treated, except for non-polluting roof runoff, prior to release into the infiltration system.

Infiltration trenches and drywells are sized to allow runoff to soak into the ground, and they perform adequately only in soils that allow water to infiltrate well. Infiltration trenches are the better infiltration option where the depth to the maximum wet-season water table or hardpan is between 3 and 6 feet. Drywells are deeper and generally more compact than infiltration trenches. Drywells can be used in areas where the depth to the maximum wet-season water table is 6 feet or greater.

Typical Uses: Roof downspouts, parking areas, driveways.

Infiltration BMPs may not be placed on or above slopes greater than 20% without evaluation by a geotechnical engineer or qualified geologist and approval by Whatcom County.

5.1 SOIL REQUIREMENTS

A soils infiltration assessment is required for all proposed or existing lots proposing infiltration systems. The infiltration assessment must be prepared by a certified sewage designer, qualified geologist, or a professional engineer registered in the State of Washington to determine if soils suitable for infiltration are present on the site. The soils infiltration assessment must include at least one soils log for each proposed infiltration trench location. Each log shall be a minimum of 4 feet deep (6 feet for drywells). The assessment shall describe the SCS series of the soil, the percolation rate, and the textural class of each horizon through the depth of the log, and it shall include notes of any evidence of a high groundwater table, such as mottling.

To be used in infiltration systems on lots smaller than 22,000 square feet, soils must be either coarse sands and cobbles or medium sands. Trenches and drywells are not allowed in imported fill materials except in engineered sand and gravel fill.

Note: A soils report produced for siting and design of an onsite sewage system may also be used to satisfy this soils infiltration assessment requirement, provided that the depth of the soil log(s) is at least 4 feet, the depth to seasonal high water table is determined, and the location of the soil logs is adequate to determine the feasibility of the infiltration system.

5.2 TRENCH REQUIREMENTS

Drawing 5.2.A and Drawing 5.2.B illustrate the requirements for infiltration trench systems as outlined below:

- Individual trench lengths shall not exceed 100 feet from the inlet sump. Multiple trenches may be required to achieve the minimum total trench length. The following are minimum total trench lengths (linear feet) per 1,000 square feet of impervious area based on soil type:

Coarse sand and cobbles:	20 LF
Medium sand:	30 LF
Fine sand and loamy sand:	75 LF
Sandy loam:	125 LF
Silt loam:	190 LF

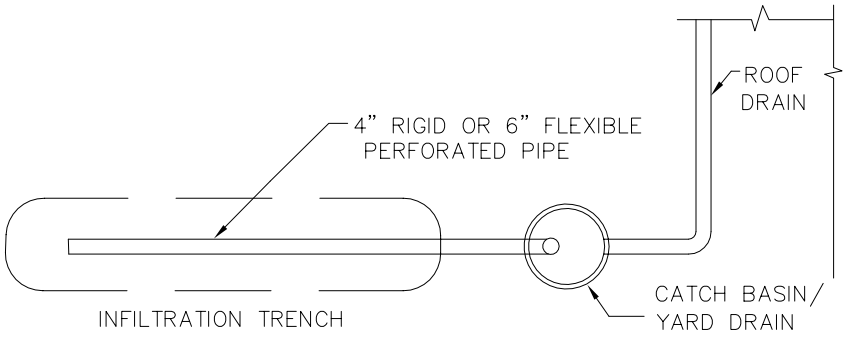
- The trench bottom must be a minimum of 1 foot above seasonal high groundwater level or impermeable soil layers.
- Filter fabric (geotextile) shall be placed on top of the drain rock and on trench sides prior to backfilling.
- Spacing between trench centerlines shall be a minimum of 6 feet.
- To prevent damage to overlying pavement, trenches located beneath pavement shall be constructed such that the trench pipe is connected to a small yard drain or catch basin with a grate cover so that if the trench infiltration capacity is exceeded, the overflow will occur out of the catch basin at an elevation at least one foot below that of any overlying pavement, and in a location which provides a safe path for the overflow.
- Runoff shall pass through a yard drain or catch basin fitted with a down-turned elbow prior to entering the infiltration trench (see Drawing 5.2.A). The elbow is to trap debris and spilled material in the catch basin sump so that the material can be removed by the homeowner.
- A minimum 15-foot setback shall be maintained between any part of an infiltration trench and any structure or property line. A 50-foot setback is required between an infiltration trench and a steep slope or landslide hazard area (this may be reduced with a geotechnical engineering report and approval of Whatcom County).
- Downspout infiltration trenches are not allowed on slopes greater than 25% (4:1). Infiltration trenches may not be placed on a landslide hazard area or above slopes greater than 20% without evaluation by a geotechnical engineer or qualified geologist and Whatcom County approval.
- For sites with septic systems, infiltration trenches must be located downgradient of the primary and reserve drainfield areas. Whatcom County permit review staff can waive this requirement based on evaluation by a geotechnical engineer or qualified geologist.

5.3 DRYWELL REQUIREMENTS

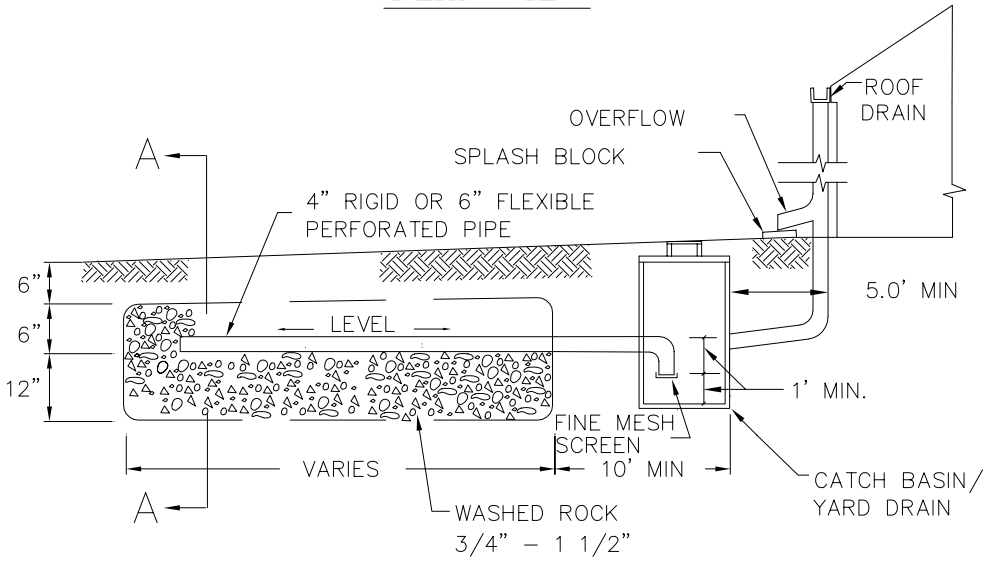
Drawing 5.3 illustrates the requirements for drywell infiltration systems as outlined below:

- Drywell bottoms must be a minimum of 1 foot above seasonal high groundwater level or impermeable soil layers.
- If using drywells, each drywell may serve up to 1000 square feet of impervious surface for either medium sands or coarse sands
- Typically drywells are 48 inches in diameter (minimum) and have a depth of 5 feet (4 feet of gravel and 1 foot of suitable cover material). See the detail in Drawing 5.3.
- Filter fabric (geotextile) shall be placed on top of the drain rock and on trench or drywell sides prior to backfilling.
- Spacing between drywell perimeters shall be a minimum of 4 feet.
- A minimum 5-foot setback shall be maintained between any part of a drywell and any structure or property line. Drywells may not be placed in sensitive area buffers. A 50-foot setback is required between a drywell and a steep slope or landslide hazard area (this may be reduced with a geotechnical engineering report and approval of Whatcom County).

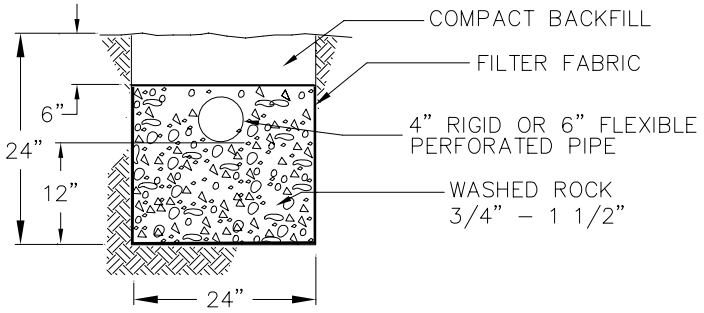
- Downspout infiltration trenches are not allowed on slopes greater than 25% (4: 1). Drywells may not be placed on a landslide hazard area or above slopes greater than 20% without evaluation by a geotechnical engineer or qualified geologist and Whatcom County approval.
- For sites with septic systems, drywells must be located downgradient of the primary and reserve drainfield areas. Whatcom County permit review staff can waive this requirement based on evaluation by a geotechnical engineer or qualified geologist.



PLAN VIEW



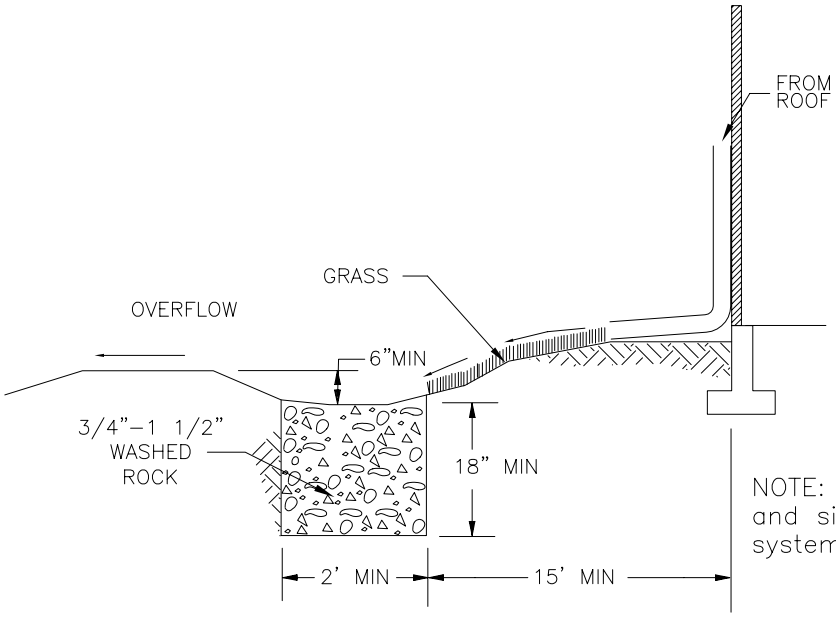
PROFILE VIEW



SECTION A – A

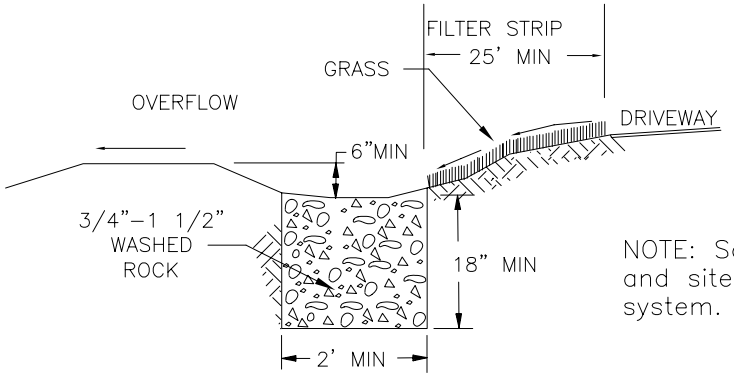
DRAWING 5.2.A
TYPICAL DOWNSPOUT INFILTRATION SYSTEM
WHATCOM COUNTY DEPARTMENT OF PUBLIC WORKS

Not to Scale



NOTE: Same length dimensions and site limitations as typical system.

X–SECTION

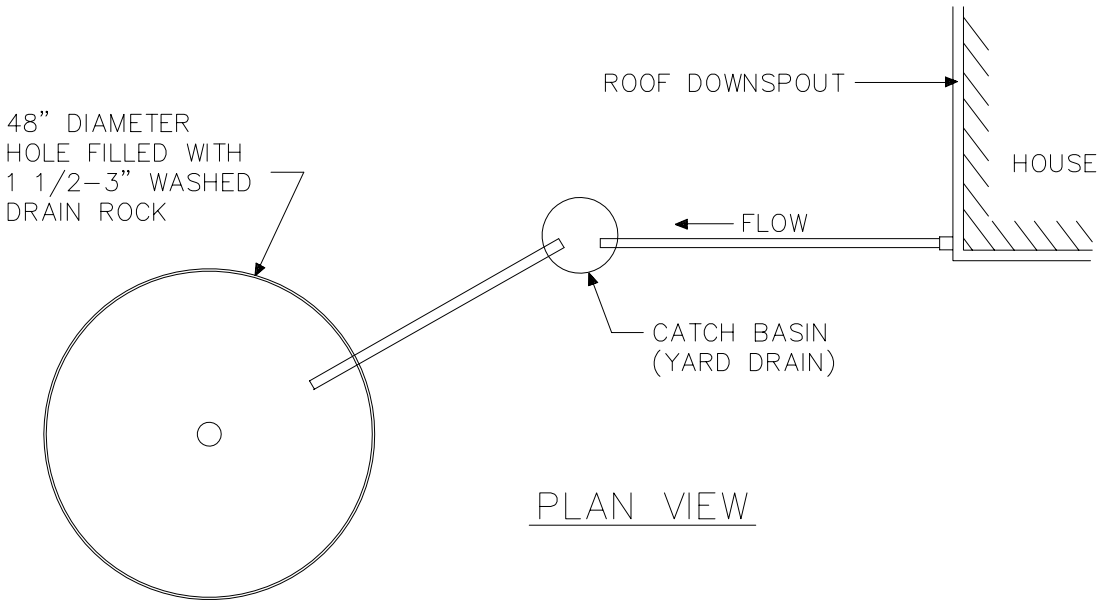


NOTE: Same length dimensions and site limitaions as typical system.

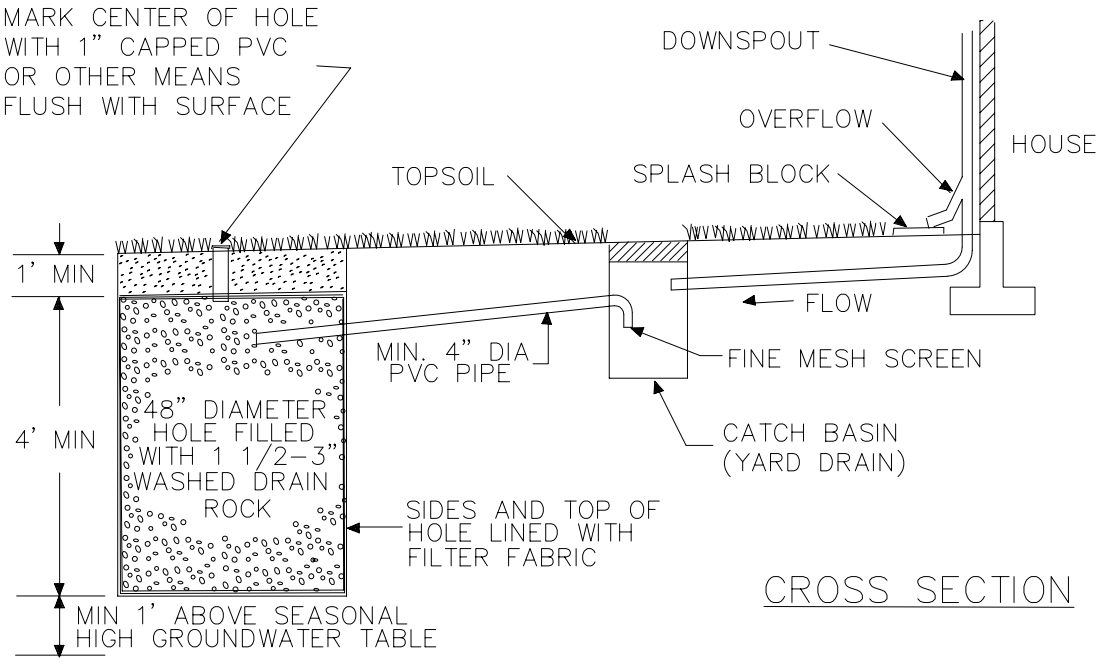
X–SECTION

DRAWING 5.2.B
ALTERNATIVE DOWNSPOUT & DRIVEWAY INFILTRATION SYSTEM
WHATCOM COUNTY DEPARTMENT OF PUBLIC WORKS

Not to Scale



PLAN VIEW



CROSS SECTION

Not to Scale

DRAWING 5.3
TYPICAL DRYWELL INFILTRATION SYSTEM
WHATCOM COUNTY DEPARTMENT OF PUBLIC WORKS

SECTION 6: RUNOFF TREATMENT

6.1 AREAS REQUIRING RUNOFF TREATMENT

Treatment shall be required for all pollution-generating impervious surfaces (PGIS). PGIS is defined as any impervious surface considered to be a significant source of pollutants in stormwater runoff. Such surfaces include those which are subject to: vehicular use; industrial activities; or storage of erodible or leachable materials, wastes, or chemicals, and which receive direct rainfall or the run-on or blow-in of rainfall. Erodible or leachable materials, wastes, or chemicals are those substances which, when exposed to rainfall, measurably alter the physical or chemical characteristics of the rainfall runoff. Examples include erodible soils that are stockpiled, uncovered process wastes, manure, fertilizers, oily substances, ashes, kiln dust, and garbage dumpster leakage. Metal roofs are also considered to be PGIS unless they are coated with an inert, non-leachable material (e.g., baked enamel coating).

Runoff treatment facilities shall be designed to treat the flow rate and flow volume associated with the 24-hour, 6-month return period storm.

6.2 RUNOFF TREATMENT ALTERNATIVES

Four general options exist for treatment of runoff from PGIS:

- Filter strip.
- Biofiltration swale.
- Bioretention facility.
- Wetpond.

A general discussion of each of these alternatives is presented in the following sections. In addition, specific design requirements are provided for filter strips and biofiltration swales.

The exact design requirements for bioretention facilities and wetponds will depend on site-specific information, such as lot size, slope, soil type, watershed, and amount of impervious surface. If the applicant selects a bioretention facility or a wetpond to provide runoff treatment, the applicant must contact County review staff for site-specific design requirements. In most cases, County review staff can provide standard construction plans to assist the applicant and/or contractor in sizing, locating, and constructing these types of facilities.

6.2.1 Filter Strip

A filter strip is a vegetated area that treats sheetflow by slowing runoff velocities and removing pollutants by sedimentation, filtration, soil sorption, and/or plant uptake. A general illustration of the placement of a filter strip is shown in Drawing 6.2.1. Filter strips can be grass-covered, forested, or of mixed vegetative cover. A filter strip is typically used adjacent and parallel to a paved area such as parking lots, driveways, and roadways. To be effective, uniform flow distribution must be maintained across the entire strip. Runoff should be diverted to an exfiltration trench bordered by a flow spreader. For optimal performance, the flow spreader should be level across the width of the strip to within $1/8^{th}$ of an inch.

The minimum width of a filter strip (parallel to the direction of flow) shall be 25 feet. The minimum length (perpendicular to the direction of flow) shall be equal to the longest dimension of the PGIS that contributes flow to the filter strip.

Maintenance requirements include regular mowing for grass-covered filter strips so that grass height does not exceed 3 to 4 inches. Removal of litter, debris, and animal waste is also necessary. Maintenance is minimal for wooded filter strips. Proper grading of the site will eliminate areas that could be prone to ponding or channeling of runoff.

6.2.2 Biofiltration Swale

A biofiltration swale is a grassed channel designed for conveyance, retention, and filtration of runoff. Filtration through grass and infiltration through soil reduce sediment and other pollutant levels. A general illustration of the placement of a biofiltration swale is shown in Drawing 6.2.2. For swales that receive only PGIS, the minimum length of a biofiltration swale shall be equal to 1.5 times the longest dimension of the PGIS that contributes flow to the swale. For swales that receive uncontaminated roof runoff in addition to PGIS, the minimum swale length shall be 100 ft. The swale shall be trapezoidal with a minimum bottom width of 2 feet. The side slopes of the channel shall be no steeper than 4H:1V. Turf-forming, water resistant grasses should be selected based on anticipated hydric conditions.

Recommended maintenance includes mowing and removal of debris and animal waste. Grass reseeding may be necessary after the first year to cover any bare areas. Sediment build-up should be removed when infiltration is compromised.

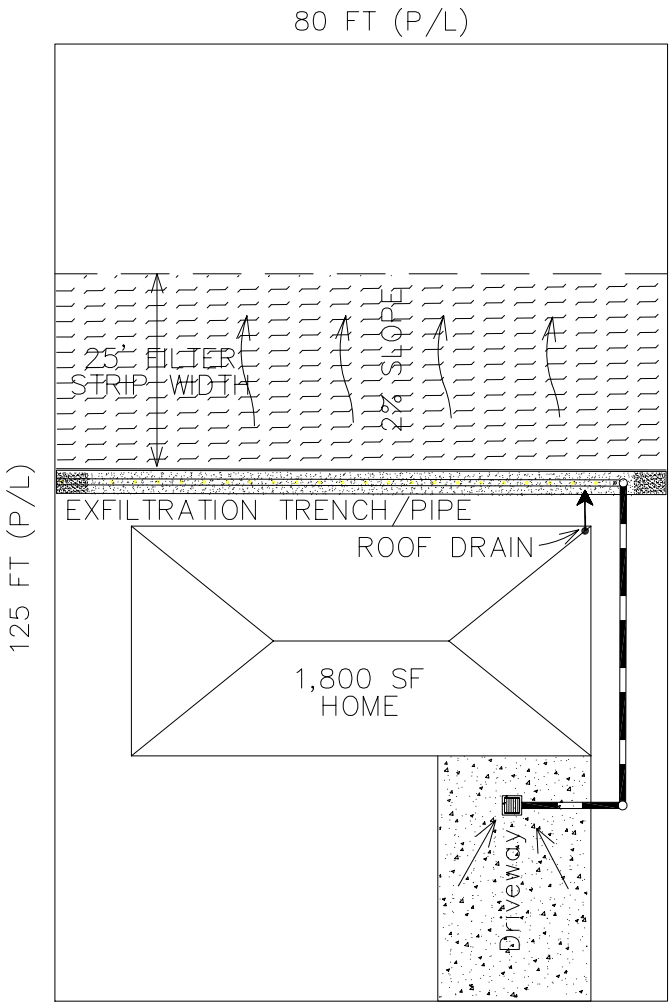
6.2.3 Bioretention

A bioretention area is designed to treat storm water using a conditioned planting soil bed and planting materials to filter runoff. A general illustration of the placement of a bioretention area is shown in Drawing 6.2.3. Surface runoff is directed into a shallow, landscaped depression that is designed to incorporate many of the pollutant removal mechanisms that operate in forested ecosystems. The underlying sand bed prevents fine soil particles from washing out through the underdrain system, working as a polishing treatment media. A gravel underdrain system collects and distributes treated excess runoff. A stand of various grasses, shrubs, and small trees is established to promote evapotranspiration, maintain soil porosity, encourage biological activity, and promote uptake of pollutants. Native plant species should be selected based on their ability to assimilate pollutant runoff and tolerate urban stress. A pea gravel drain overflow conveys larger storm flow volumes to the drainage system.

Appropriate vegetation should be selected based on hydric tolerance. Plants in the lowest zone (bottom of depression) should be species adapted to standing and fluctuating water levels. Trees should be planted along the perimeter of the bioretention area to provide a canopy for shrubs and other plant materials. Maintenance includes routine landscape maintenance, debris removal, and cleaning of inlet and outlet structures.

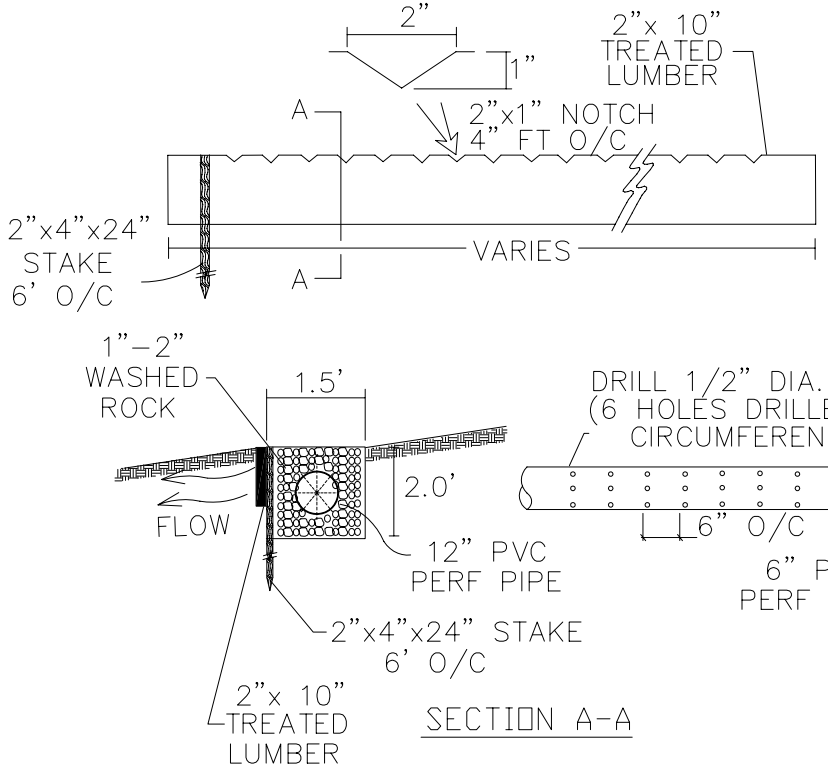
6.2.4 Wetpond

One of the most widely used stormwater practices, a wet pond provides flood control, channel protection, and pollutant removal. Wet detention ponds are constructed basins providing both detention and water quality treatment of runoff. Sedimentation processes remove particulates, organic matter, and metals, while dissolved metals and nutrients are removed through biological uptake. Dredging is recommended when silt accumulation exceeds 6 inches along the bottom of the bed.



PLAN VIEW

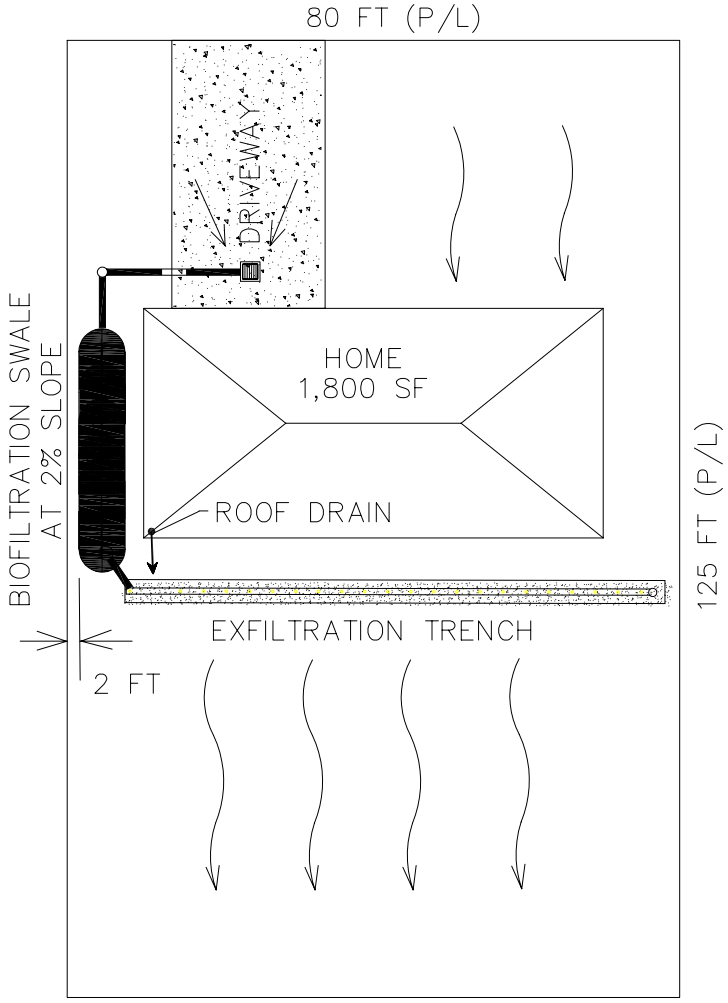
EXFILTRATION TRENCH - CROSS SECTION



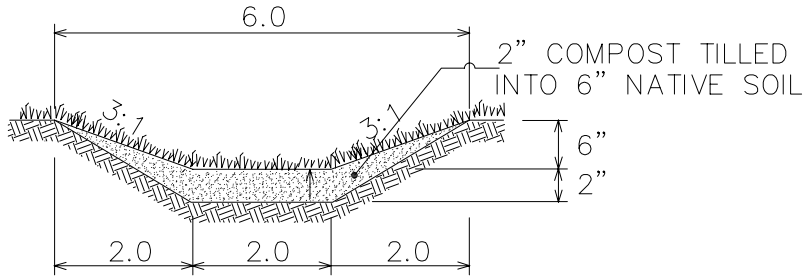
NOTE: Minimum filter strip length (perpendicular to the direction of flow) shall be equal to the longest dimension of the PGIS that contributes flow to the filter strip.

Not to Scale

DRAWING 6.2.1
TYPICAL FILTER STRIP FOR SINGLE FAMILY RESIDENCE
WHATCOM COUNTY DEPARTMENT OF PUBLIC WORKS



PLAN VIEW

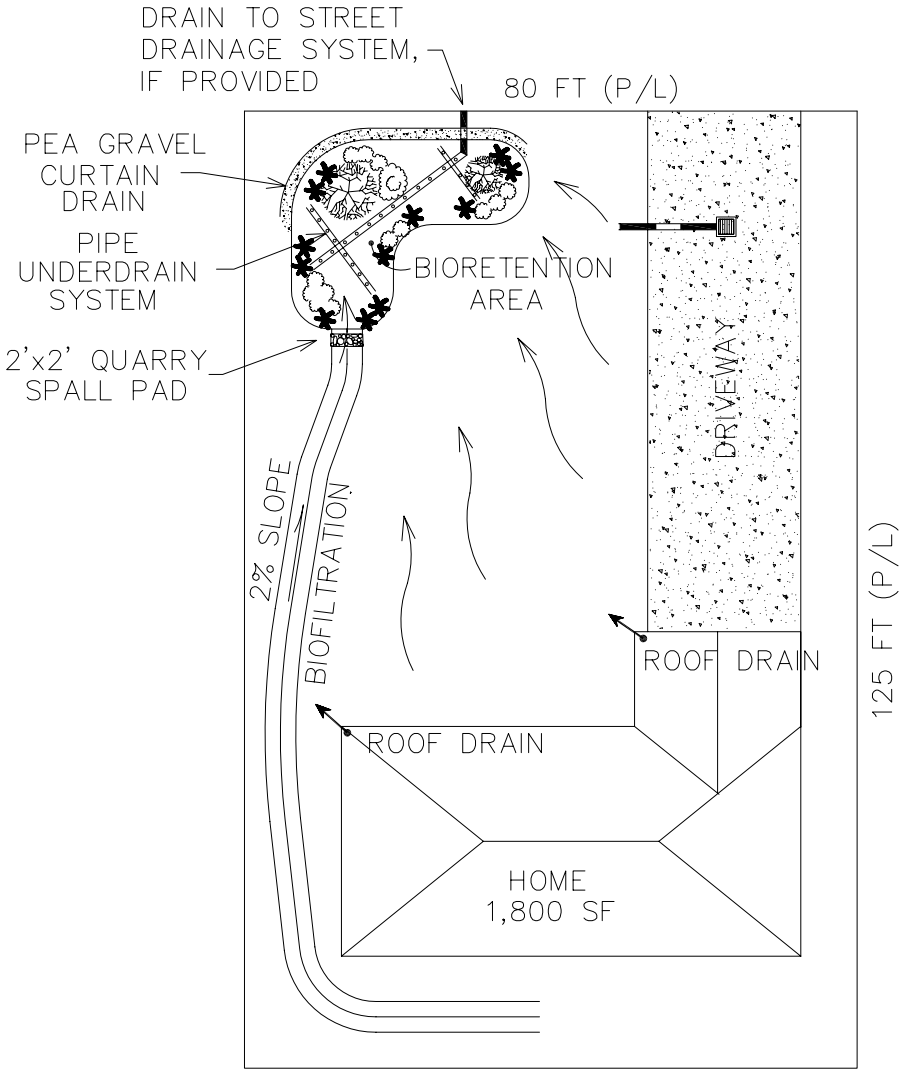


BIOSWALE SECTION

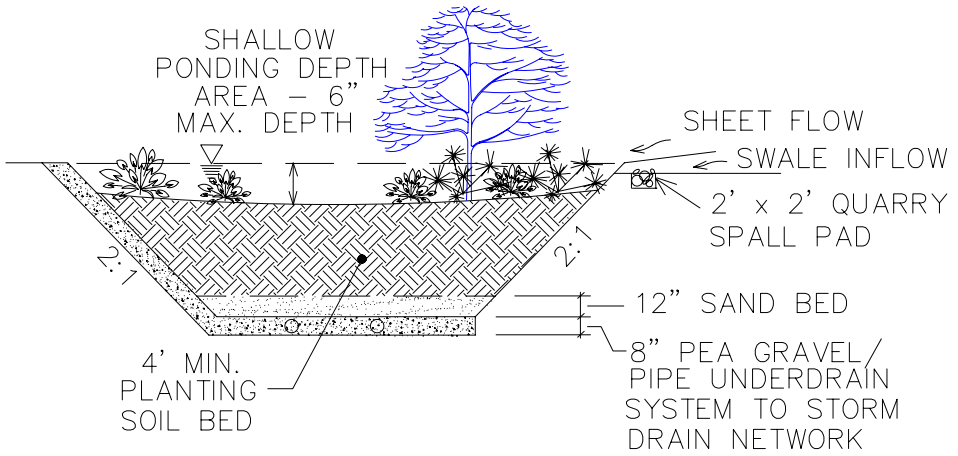
NOTE: For swales that receive only PGIS, the minimum length of a biofiltration swale shall be equal to 1.5 times the longest dimension of the PGIS that contributes flow to the swale. For swales that receive uncontaminated roof runoff in addition to PGIS, the minimum swale length shall be 100 feet.

Not to Scale

DRAWING 6.2.2
BIOFILTRATION SWALE DETAIL FOR SINGLE FAMILY RESIDENCE
WHATCOM COUNTY DEPARTMENT OF PUBLIC WORKS



PLAN VIEW



BIORETENTION SECTION VIEW

Not to Scale

DRAWING 6.2.3
BIORETENTION/BIOSWALE DETAIL FOR SINGLE FAMILY RESIDENCE
WHATCOM COUNTY DEPARTMENT OF PUBLIC WORKS

SECTION 7: DETENTION

7.1 THRESHOLD

Detention facilities shall be required for projects that, through a combination of effective impervious surfaces and converted pervious surfaces, cause an increase of 0.1 cubic feet per second or greater in the 24-hour, 100-year peak flow rate as estimated using an approved hydrology model. Determination of the peak flow rate for pre- and post-development conditions may be conducted by County review staff or by the applicant's engineer.

Detention facilities shall be designed such that peak discharge rates from the 24-hour, 1-, 2-, 10-, 25-, and 100-year storm events do not exceed pre-development peak runoff rates.

7.2 DETENTION CREDITS

There are specific cases where the requirement for detention can be met with alternative technology or facilities. The following sections identify three specific examples of detention credits.

7.2.1 Detention Credit for Dispersion

If roof runoff is ***dispersed*** using a dispersion trench designed according to the requirements of Section 4 on single-family lots greater than 22,000 square feet, and the vegetative flow path of the roof runoff is 50 feet or larger, the roof area may be modeled as grassed surface. In many cases, this credit will keep the project below the threshold for detention in Section 7.1.

7.2.2 Detention Credit for Soil Amendment/Mitigation

For sites where detention is required based on the threshold in Section 7.1, Whatcom County review staff may, on a case-by-case basis, allow soil amendment/mitigation to be used in lieu of detention facilities, provided that an equivalent level of detention is achieved. Appendix B contains additional information regarding soil amendment/mitigation.

7.2.3 Detention Credit for Specific Water Quality Facilities

For sites where detention is required based on the threshold in Section 7.1, Whatcom County review staff may waive the detention requirement if the applicant elects to construct either a bioretention facility (Section 6.2.3) or a wetpond (Section 6.2.4), provided that the water quality facility is sized to provide adequate detention.

7.3 DETENTION ALTERNATIVES

Two general options exist for onsite detention:

- Detention pipes
- Detention ponds

A general discussion of each of these alternatives is presented in the following sections. However, the exact design requirements for an onsite detention facility will depend on site-

specific information, such as lot size, slope, soil type, watershed, and amount of impervious surface. The applicant must contact County review staff for site-specific design requirements. In most cases, County review staff can provide standard construction plans to assist the applicant and/or contractor in sizing, locating, and constructing detention facilities.

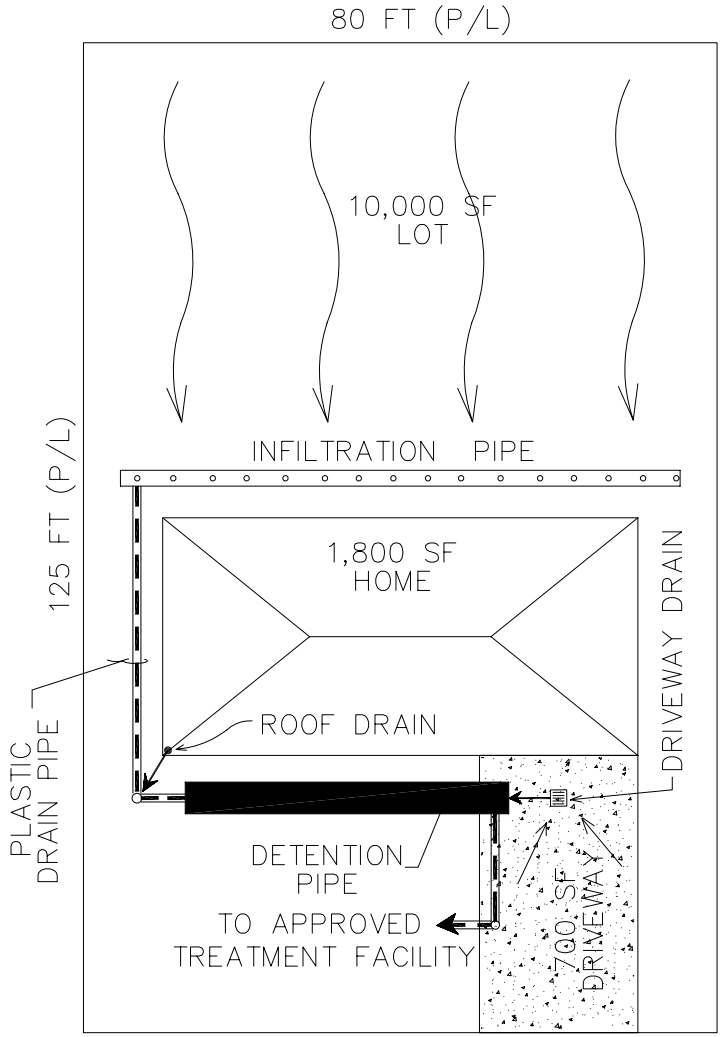
7.3.1 Detention Pipe

A general illustration of the placement of a detention pipe is shown in Drawing 7.3.1. A detention pipe is a below-ground plastic pipe, approximately 36" – 48" inches in diameter. Runoff from onsite impervious and pervious surfaces is conveyed to the detention pipe and released at a controlled rate through a PVC riser. The riser pipe has either 2 or 3 orifices in order to achieve required release rates. An access port must be provided so that the detention pipe can be periodically inspected and maintained. Required maintenance includes removal of accumulated sediment from the pipe and riser.

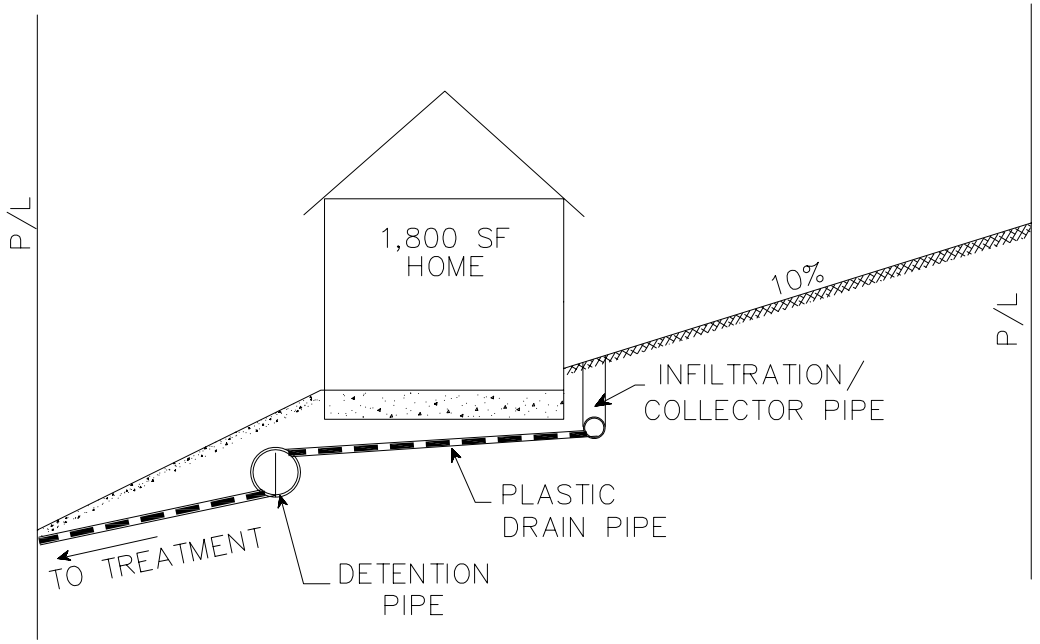
The pipe dimensions and the orifice characteristics depend on site-specific factors. A typical system requires 4.5 to 6.0 feet of elevation difference between the finished grade above the detention pipe and the invert of the offsite receiving drain. Consequently, the system will not work on a flat site. Lots that are characterized by slopes of 10% or greater are ideal for installation.

7.3.2 Detention Pond

A general illustration of the placement of a detention pond is shown in Drawing 7.3.2. A detention pond operates under the same principle as a detention pipe; runoff is collected in a small pond and released at a controlled rate through a riser pipe or similar outlet structure. Ponds are typically less expensive to construct than detention pipes, but require more area. As with detention pipes, the pond size and outlet structure characteristics depend on site-specific information. The pond may be vegetated with water resistant grasses or landscaping. Required maintenance includes periodic mowing or landscape maintenance of the pond and removal of debris from the outlet structure.



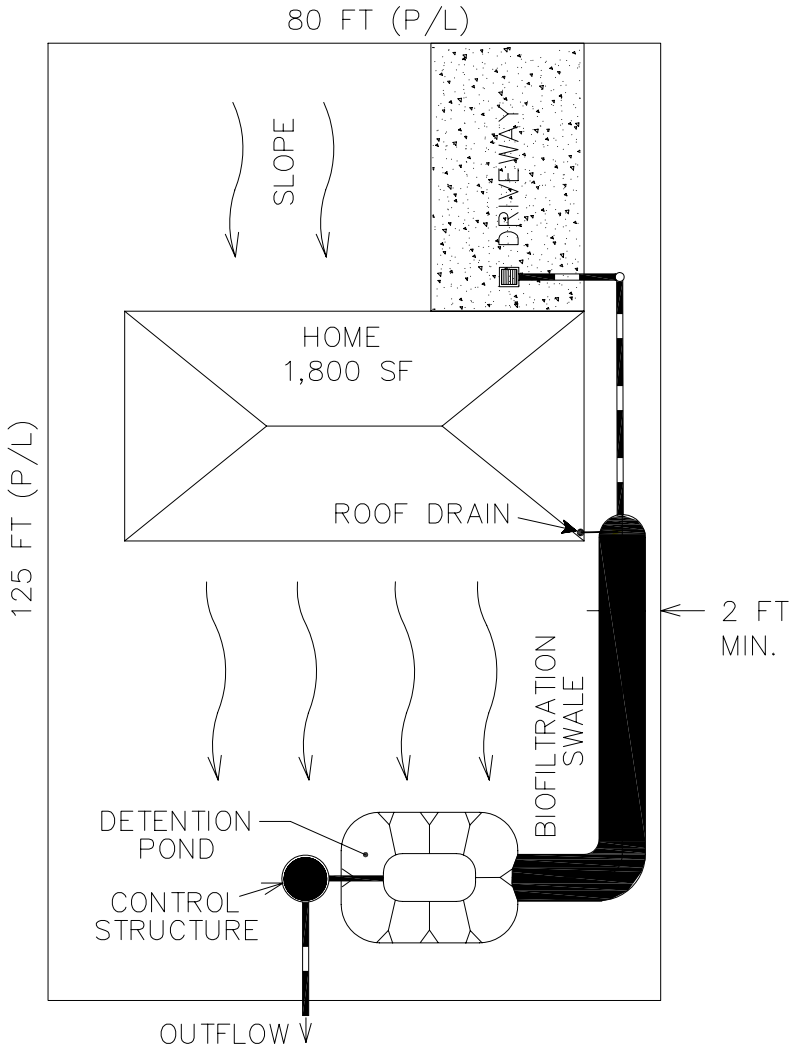
PLAN VIEW



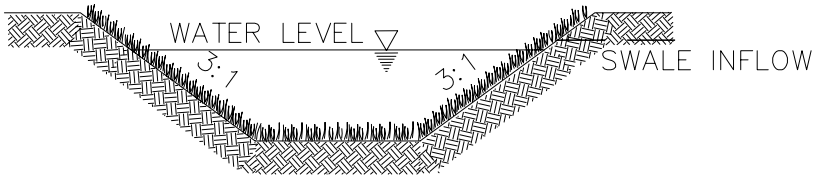
SECTION VIEW

Not to Scale

DRAWING 7.3.1
TYPICAL DETENTION PIPE LAYOUT FOR SINGLE FAMILY RESIDENCE
WHATCOM COUNTY DEPARTMENT OF PUBLIC WORKS



PLAN VIEW



POND SECTION VIEW

Not to Scale

DRAWING 7.3.2
DETENTION POND/BIOSWALE FOR SINGLE FAMILY RESIDENCE
WHATCOM COUNTY DEPARTMENT OF PUBLIC WORKS

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GLOSSARY

Applicant The person who has applied for a development permit or approval.

Best management practice (BMP) The schedules of activities, prohibitions of practices, maintenance procedures, and structural and/or managerial practices, that when used singly or in combination, prevent or reduce the release of pollutants and other adverse impacts to waters of Washington State.

Biofiltration The process of reducing pollutant concentrations in water by filtering the polluted water through biological materials.

Bioretention On-lot retention of stormwater through the use of vegetated depressions engineered to collect, store, and infiltrate runoff.

Check dam Small dam constructed in a gully or other small watercourse to decrease the streamflow velocity, minimize channel scour, and promote deposition of sediment.

Compost Organic residue or a mixture of organic residues and soil, that has undergone biological decomposition until it has become relatively stable humus. Reference note: The Department of Ecology Interim Guidelines for Compost Quality (1994) defines compost as "the product of composting; it has undergone an initial, rapid stage of decomposition and is in the process of humification (curing)." Compost used should meet specifications for grade A or AA compost in Ecology publication 94-038.

Composted Mulch Mulch prepared from decomposed organic materials that have undergone a controlled process to minimize weed seeds. Acceptable feedstocks include, but are not limited to, yard debris, wood waste, land clearing debris, brush, and branches.

Dispersion Release of surface and stormwater runoff from a drainage facility system such that the flow spreads over a wide area and is located so as not to allow flow to concentrate anywhere upstream of a drainage channel with erodible underlying granular soils.

ESC Erosion and Sediment Control (Plan).

Erosion and sedimentation control Any temporary or permanent measures taken to reduce erosion; control siltation and sedimentation; and ensure that sediment-laden water does not leave the site.

Exfiltration The downward movement of runoff through the bottom of an infiltration BMP into the soil layer or the downward movement of water through soil.

Filter fabric A woven or nonwoven, water-permeable material generally made of synthetic products such as polypropylene and used in stormwater management and erosion and sediment control applications to trap sediment or prevent the clogging of aggregates by fine soil particles.

Filter strip A grassy area with gentle slopes that treats stormwater runoff from adjacent paved areas before it concentrates into a discrete channel.

Flow control facility A drainage facility designed to mitigate the impacts of increased surface and stormwater runoff flow rates generated by development. Flow control facilities are designed either to hold water for a considerable length of time and then release it by evaporation, plant transpiration, and/or infiltration into the ground, or to hold runoff for a short period of time, releasing it to the conveyance system at a controlled rate.

Impervious A surface which cannot be easily penetrated. For instance, rain does not readily penetrate paved surfaces.

Impervious surface A hard surface area which either prevents or retards the entry of water into the soil mantle as under natural conditions prior to development. A hard surface area which causes water to run off the surface in greater quantities or at an increased rate of flow from the flow present under natural conditions prior to development. Common impervious surfaces include, but are not limited to, rooftops, walkways, patios, driveways, parking lots or storage areas, concrete or asphalt paving, gravel roads, packed earthen materials, and oiled, macadam or other surfaces which similarly impede the natural infiltration of stormwater. Open, uncovered retention/detention facilities shall not be considered as impervious surfaces for the purposes of determining whether the thresholds for application of minimum requirements are exceeded. Open, uncovered retention/detention facilities shall be considered impervious surfaces for purposes of runoff modeling.

Infiltration Means the downward movement of water from the surface to the subsoil.

Landslide Episodic downslope movement of a mass of soil or rock that includes but is not limited to rockfalls, slumps, mudflows, and earthflows.

Landslide hazard areas Those areas subject to a severe risk of landslide.

Native Growth Protection Easement (NGPE) An easement granted for the protection of native vegetation within a sensitive area or its associated buffer. The NGPE shall be recorded on the appropriate documents of title and filed with the County Records Division.

Native vegetation Vegetation comprised of plant species, other than noxious weeds, that are indigenous to the coastal region of the Pacific Northwest and which reasonably could have been expected to naturally occur on the site. Examples include trees such as Douglas fir, Western Hemlock, Western Red Cedar, Alder, Big-leaf Maple, and Vine Maple; shrubs such as willow, elderberry, and salmonberry; and herbaceous plants such as sword fern, foam flower, and fireweed.

Orifice An opening with closed perimeter, usually sharp-edged, and of regular form in a plate, wall, or partition through which water may flow, generally used for the purpose of measurement or control of water.

Overflow A pipeline or conduit device, together with an outlet pipe, that provides for the discharge of portions of combined sewer flows into receiving waters or other points of disposal, after a regular device has allowed the portion of the flow which can be handled by interceptor sewer lines and pumping and treatment facilities to be carried by and to such water pollution control structures.

Percolation rate The rate, often expressed in minutes/inch, at which clear water, maintained at a relatively constant depth, will seep out of a standardized test hole that has been previously saturated. The term percolation rate is often used synonymously with infiltration rate (short-term infiltration rate).

Permeable soils Soil materials with a sufficiently rapid infiltration rate so as to greatly reduce or eliminate surface and stormwater runoff. These soils are generally classified as SCS hydrologic soil types A and B.

Plat A map or representation of a subdivision showing the division of a tract or parcel of land into lots, blocks, streets, or other divisions and dedications.

Pollution-generating impervious surface (PGIS) Those impervious surfaces considered to be a significant source of pollutants in stormwater runoff. Such surfaces include those which are subject to: vehicular use; industrial activities (as further defined in this glossary); or storage of erodible or leachable materials, wastes, or chemicals, and which receive direct rainfall or the run-on or blow-in of rainfall. Erodible or leachable materials, wastes, or chemicals are those substances which, when exposed to rainfall, measurably alter the physical or chemical characteristics of the rainfall runoff. Examples include erodible soils that are stockpiled, uncovered process wastes, manure, fertilizers, oily substances, ashes, kiln dust, and garbage dumpster leakage. Metal roofs are also considered to be PGIS unless they are coated with an inert, non-leachable material (e.g., baked-on enamel coating).

A surface, whether paved or not, shall be considered subject to vehicular use if it is regularly used by motor vehicles. The following are considered regularly-used surfaces: roads, unvegetated road shoulders, bike lanes within the traveled lane of a roadway, driveways, parking lots, unfenced fire lanes, vehicular equipment storage yards, and airport runways.

The following are not considered regularly-used surfaces: paved bicycle pathways separated from and not subject to drainage from roads for motor vehicles, fenced fire lanes, and infrequently used maintenance access roads.

Pollution-generating pervious surface (PGPS) Any non-impervious surface subject to use of pesticides and fertilizers or loss of soil. Typical PGPS include lawns, landscaped areas, golf courses, parks, cemeteries, and sports fields.

Project Any proposed action to alter or develop a site. The proposed action of a permit application or an approval, which requires drainage review.

Project site That portion of a property, properties, or right of way subject to land disturbing activities, new impervious surfaces, or replaced impervious surfaces.

Retention/detention facility (R/D) A type of drainage facility designed either to hold water for a considerable length of time and then release it by evaporation, plant transpiration, and/or infiltration into the ground; or to hold surface and stormwater runoff for a short period of time and then release it to the surface and stormwater management system.

Riser A vertical pipe extending from the bottom of a pond BMP that is used to control the discharge rate from a BMP for a specified design storm.

Roof Area Total square feet of building footprint plus roof overhang.

Runoff Water originating from rainfall and other precipitation that is found in drainage facilities, rivers, streams, springs, seeps, ponds, lakes and wetlands as well as shallow ground water. As applied in this manual, it also means the portion of rainfall or other precipitation that becomes surface flow and interflow.

SCS Soil Conservation Service (now the Natural Resources Conservation Service), U.S. Department of Agriculture

Sediment Fragmented material that originates from weathering and erosion of rocks or unconsolidated deposits, and is transported by, suspended in, or deposited by water.

Sedimentation The depositing or formation of sediment.

Sheet flow Runoff that flows over the ground surface as a thin, even layer, not concentrated in a channel.

Site The legal boundaries of a parcel or parcels of land that is (are) subject to new development or redevelopment. For road projects, the length of the project site and the right-of-way boundaries define the site.

Slope Degree of deviation of a surface from the horizontal; measured as a numerical ratio, percent, or in degrees. Expressed as a ratio, the first number is the horizontal distance (run) and the second is the vertical distance (rise), as 2:1. A 2:1 slope is a 50 percent slope. Expressed in degrees, the slope is the angle from the horizontal plane, with a 90-degree slope being vertical (maximum) and a 45-degree slope being 1:1 or 100 percent.

Soil group, hydrologic A classification of soils by the Soil Conservation Service into four runoff potential groups. The groups range from A soils, which are very permeable and produce little or no runoff, to D soils, which are not very permeable and produce much more runoff.

Soil stabilization The use of measures such as rock lining, vegetation or other engineering structures to prevent the movement of soil when loads are applied to the soil.

Soil Texture Class The relative proportion, by weight, of particle sizes, based on the USDA system of individual soil grains less than 2 mm equivalent diameter in a mass of soil. The basic texture classes in the approximate order of increasing proportions of fine particles include: sand, loamy sand, sandy loam, loam, silt loam, silt, clay loam, sandy clay, silty clay, and clay.

Steep slope Slopes of 20 percent gradient or steeper within a vertical elevation change of at least ten feet. A slope is delineated by establishing its toe and top, and is measured by averaging the inclination over at least ten feet of vertical relief. For the purpose of this definition: The toe of a slope is a distinct topographic break in slope that separates slopes inclined at less than 20% from slopes 20% or steeper. Where no distinct break exists, the toe of a steep slope is the lower-most limit of the area where the ground surface drops ten feet or more vertically within a horizontal distance of 25 feet; AND The top of a slope is a distinct topographic break in slope that separates slopes inclined at less than 20% from slopes 20% or steeper. Where no distinct break exists, the top of a steep slope is the upper-most limit of the area where the ground surface drops ten feet or more vertically within a horizontal distance of 25 feet.

Stormwater That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes and other features of a stormwater drainage system into a defined surface water body, or a constructed infiltration facility.

Stormwater facility A constructed component of a stormwater drainage system, designed or constructed to perform a particular function, or multiple functions.
Stormwater facilities include, but are not limited to, pipes, swales, ditches, culverts, street gutters, detention ponds, retention ponds, constructed wetlands, infiltration devices, catch basins, oil/water separators, and biofiltration swales.

Swale A shallow drainage conveyance with relatively gentle side slopes, generally with flow depths less than one foot.

Treatment BMP A BMP that is intended to remove pollutants from stormwater. A few examples of treatment BMPs are detention ponds, oil/water separators, biofiltration swales, and constructed wetlands.

Underdrain Plastic pipes with holes drilled through the top, installed on the bottom of an infiltration BMP, which are used to collect and remove excess runoff.

Water quality A term used to describe the chemical, physical, and biological characteristics off water, usually in respect to its suitability for a particular purpose.

Watershed A geographic region within which water drains into a particular river, stream, or body of water. Watersheds can be as large as those identified and numbered by the State of Washington Water Resource Inventory Areas (WRIAs) as defined in Chapter 173-500 WAC.

Water table The upper surface or top of the saturated portion of the soil or bedrock layer, indicates the uppermost extent of ground water.

Wetlands Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. Wetlands do not include those artificial wetlands intentionally created from nonwetland sites, including, but not limited to, irrigation and drainage ditches, grass-lined swales, canals, detention facilities, wastewater treatment facilities, farm ponds, and landscape amenities, or those wetlands created after July 1, 1990, that were unintentionally created as a result of the construction of a road, street, or highway. Wetlands may include those artificial wetlands intentionally created from nonwetland areas to mitigate the conversion of wetlands. (Water bodies not included in the definition of wetlands as well as those mentioned in the definition are still waters of the state.)

Wetponds and wetvaults Drainage facilities for water quality treatment that contain permanent pools of water that are filled during the initial runoff from a storm event. They are designed to optimize water quality by providing retention time in order to settle out particles of fine sediment to which pollutants such as heavy metals absorb, and to allow biologic activity to occur that metabolizes nutrients and organic pollutants.

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APPENDIX A – RECORDING DOCUMENTS

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AFTER RECORDING RETURN TO:
_____
_____
_____

PROTECTIVE NATIVE GROWTH AREA LOCATION SITE PLAN

In consideration of the following Whatcom County permit for application No.___ _____ relating to the real property legally described as follows (**use legal description from current deed**):
Assessor Parcel # _____
_____
_____
_____
_____
_____

The undersigned as Grantor(s) declares that the above-describe property is hereby established as a Protective Native Growth Area for the purpose of dispersing and treating stormwater flows and is subject to restrictions applying to vegetation removal in all designated areas as shown in **Attachment A**, and hereby covenants and agrees as follows:

1. Any alterations to critical areas and their buffers shall be pursuant to Whatcom County Code 16.16.
2. The remaining property outside of the critical areas and their buffers, residences, roadways, drainage facilities, drainfield areas, lawns and pastures shall be maintained in a forested condition. The following activities are allowed:

    a. On slopes which have been disturbed by human activity or infested by noxious weeds, replacement with appropriate native species or other appropriate vegetation.

    b. Construction of private trails, provided that they are guided by construction and maintenance standards in the US Forest Service “Trails Management Handbook” (FSH 2309.18, June 1987, as amended) and “Standard Specifications for Construction of Trails” (EM-7720-102, June 1984, as amended); but in no case shall trails be constructed of concrete or asphalt.

    c. Limited trimming and pruning of vegetation for the creation and maintenance of views.

    d. Replacement of individual trees with native trees on a limited basis. Forested hydrologic conditions and soil stability shall be maintained.

This covenant is binding upon the GRANTOR (s), it's heirs, successors, and assigns unless or until a new drainage or site plan is reviewed and approved by Whatcom County.

GRANTOR _____ GRANTOR_____

Print name _____ Print name _____

STATE OF WASHINGTON)
) §
COUNTY OF WHATCOM)

On this day personally appeared before me: _____,

to me known to be the individual(s) described in and who executed the within and foregoing instrument and acknowledged that they signed the same as their free and voluntary act and deed for the uses and purposes therein mentioned.

Given under my hand and official seal this ____ day of _____, 20____

_____
NOTARY PUBLIC in and for the State of Washington
residing at _____, Washington
My commission expires _____

AFTER RECORDING RETURN TO:
_____
_____
_____

STORMWATER FACILITY LOCATION SITE PLAN

In consideration of the following Whatcom County permit for application No._____ relating to the real property legally described as follows (**use legal description from current deed**):
Assessor Parcel # _____
_____
_____
_____
_____
_____

The undersigned as Grantor(s) declares that the stormwater facility required, pursuant to Title 20, Whatcom County Zoning Ordinance, 20.80.635 through 20.80.636, is located on the real property legally described above as denoted in **Attachment A**. The site plan is binding upon the GRANTOR (s), it's heirs, successors, and assigns unless or until a new drainage or site plan is reviewed and approved by Whatcom County.

GRANTOR _____ GRANTOR_____

Print name _____ Print name _____

STATE OF WASHINGTON)
) §
COUNTY OF WHATCOM)

On this day personally appeared before me: _____,
to me known to be the individual described in and who executed the within and foregoing instrument and acknowledged that they signed the same as their free and voluntary act and deed for the uses and purposes therein mentioned.

Given under my hand and official seal this ____ day of _____, 20____

_____
NOTARY PUBLIC in and for the State of Washington
residing at _____, Washington
My commission expires _____

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APPENDIX B – SOIL AMENDMENT INFORMATION

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SOIL AMENDMENT

Amending a soil with compost increases the soil's permeability and water holding capacity, thereby delaying and often reducing the peak stormwater run-off flow rate, and decreasing irrigation water requirements. Amending soils will also enhance the lawns long-term aesthetics while reducing fertilizer and pesticide requirements.

The benefits of increasing a soils organic content have previously been established through research, however, traditional lawn installation procedures continue in new developments. As a means to promote the use of soil amendments, the *Guidelines for Landscaping with Compost-Amended Soils, City of Redmond, Wa, were* developed. These guidelines:

(1) Address the benefits associated with turf grown on compost-amended soil,
(2) Describe factors to be considered and the procedures to be followed,
(3) Provide a cost analysis of compost amending over traditional lawn installation procedures,
(4) Project the payback-period for turf grown on compost-amended soil, and
(5) Address how compost-amendment improves soil quality.

To maximize the benefits of compost addition, these guidelines set an amended soil organic content goal of between eight and thirteen percent, by weight. As a general rule of thumb this goal can be achieved by incorporating two units of loose soil with one unit of loose compost (a 2:1 ratio). Final depth of amended soil will be between eight and ten inches, dependent upon the equipment used.

Compost-amended soil has many potential benefits when instituted with establishment of turf and landscaping, including: (1) increased water conservation, (2) increased nutrient retention, (3) better turf aesthetics, (4) reduced need for chemical use, (5) improved stormwater retention, and (6) cost-savings to the private landowner.

Compost is aerobically decomposed organic waste and it has a long history of use as an agricultural soil amendment. Now, as urban and suburban communities are taking up more of the landscape, compost is being reassessed as a tool for improving the overall soil quality within these environments. The quantity of compost to be incorporated into a site is determined by the final organic content goal for the soil.

SOIL MITIGATION

Soil mitigation is intended to substantially increase the water-holding capacity of soils where native soils have been removed, compacted, or the ground has otherwise lost permeability. This activity should not be used to replace intact or minimally damaged native soils.

To improve storm water attenuation, one method to deal with compacted (relatively impervious) soils is to essentially replace them through surface preparation of the compacted area, addition of a permeable sand or similar substrate followed by either a compost-topsoil mix and/or sod. The amount of sand and topsoil/compost, and the amount of mixing of the layers will depend on site conditions, the design goals of the developer, and amount of detention credit desired.

See the 2001 Stormwater Management Manual for Western Washington BMP's T5.13, T5.35, and T5.36 for guidelines. Non-polluting materials are required for soil mitigation. Use of

materials such as crumb rubber will be subject to close review and will require extenuating circumstances to be considered as a soil mitigation option.

APPENDIX C – APPROVED NATIVE PLANT LIST

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Approved
Native Plant List*

*This is only a partial list. Many other approved plants are available. Please contact the Whatcom County Natural Resources Technical Staff at 676-6907 for additional information.

TREES

Acer Circinatum (Vine maple)
Acer macrophyllum (Bigleaf maple)
Alnus rubra (Red alder)
Amelanchier alnifolia (Western serviceberry)
Cornus nuttallii (Pacific dogwood)
Crataegus sukdorfii (Black hawthorn)
Fraxinus latifolia (Oregon ash)
Malus fusca (Pacific crabapple)
Picea sitchensis (Sitka spruce)
Pinus contorta (Shore pine)
Populus balsamifera (Black cottonwood)
Prunus emarginata (Bitter cherry)
Pseudotsuga menziesii (Douglas fir)
Rhamnus purshiana (Cascara)
Salix species (native willows)
Thuja plicata (Western red cedar)
Tsuga heterophylla (Western hemlock)

SHRUBS

Berberis nervosa (Oregon grape)
Cornus sericea (Red osier dogwood)
Cornus cornuta (Beaked hazelnut)
Gaultheria shallon (salal)
Holodiscus discolor (Oceanspray)
Lonicera involucrata (Black twinberry)
Oemleria cerasiformis (Indian plum)
Physocarpus capitatus (Pacific ninebark)
Ribes sanguineum (Red flowering currant)
Rosa species (native rose)
Rubus parviflorus (Thimbleberry)
Rubus spectabilis (Salmonberry)
Sambucus racemosa (Red elderberry)
Symphoricarpus albus (Snowberry)
Vaccinium parvifolium (Red huckleberry)

FERNS, GROUNDCOVERS, HERBACEOUS PERENNIALS

Adiantum aleuticum (Maidenhair ferm)
Asarium caudatum (Wild ginger)
Athyrium filix-femina (Lady fern)
Blechnum spicant (Deer fern)
Cornus unalaschkensis (Bunchberry)
Dicentra formosa (Pacific bleeding heart)
Linnaea borealis (Twinflower)
Maianthemum dilatatum (False lily of the valley)
Polystichum munitum (Sword fern)
Carex species (Sedges, bulrushes)
Juncus species (Rushes)