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CITY OF BRIER T.E.C.P. / B.M.P.

PHONE: 425-775-5440
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ORIGINAL

October 22nd ,2004

TO: ALL DEVELOPERS, HOME BUILDERS & PROPERTY OWNERS

DUE TO WEATHER RELATED EVENTS (RAIN,WIND, HAIL, SNOW) THAT OCCUR DURING THE FALL AND WINTER MONTHS, THE **CITY OF BRIER** WILL REQUIRE THAT EVERYONE TO WHOM THIS LETTER IS ADDRESSED SHALL HAVE TO COVER ANY EXPOSED PILE OF DIRT, FILL OR SAND IN ACCORD WITH ALL *BEST MANAGEMENT PRACTICES.* (BMP)

THE FOLLOWING ARE *BMP'S* THAT THE **CITY OF BRIER** WILL REQUIRE UPON THE START DATE OF CONSTRUCTION, WORK, ETC. THESE WILL TAKE EFFECT IMMEDIATELY AS OF THE DATE ISSUED ON THIS LETTER: OCT. 22ND 2004. **THERE WILL BE NO EXCEPTIONS!**

1. ALL PILE OF DIRT, FILL, SAND ETC. WHICH WILL NOT BE USED (FOR BACKFILL) OR MOVED WITHIN 3 DAYS WILL BE COVERED WITH SOME TYPE OF PLASTIC (VISQUEEN, TARP ETC.) AND ANCHORED DOWN WITH ROPE AND WEIGHTS OF SOME KIND OR SAND BAGS.

2. ANY EXPOSED OR BARE GROUND NOT BEING WORKED ON FOR A 3-DAY PERIOD WILL BE COVERED BY ONE OF THE FOLLOWING METHODS:
   A . STRAW TO COMPLETELY COVER ANY BARE GROUND.
   B . HOG FUEL
   C . JUTE NETS OR BLANKETS

3. ANY AREA THAT HAS NATURAL OR MAN-MADE SWALES WILL HAVE STRAW BALES AND FILTER FABRIC INSTALLED THROUGH OUT THE SWALE TO CONTROL EROSION.

4. ROCK CHECK DAMS WILL BE REQUIRED, AT THE **CITY OF BRIERS** DIRECTION TO CONTROL WATER VELOCITY AND FLOW.

5. CATCH BASINS WILL BE COVERED WITH FILTER FABRIC AND/OR "SOCKS" WILL BE INSTALLED AT THE **CITY OF BRIERS** DIRECTION.

6. FILTER FABRIC AND CATCH BASIN SOCKSWILL BE REPLACED AS NEEDED OR WHEN DIRECTED TO DO SO BY BRIER PUBLIC WORKS DEPARTMENT.

IF YOU'VE ANY QUESTIONS OR COMMENTS, YOU MAY CONTACT THE **CITY OF BRIER PLANNING DEPT.** AT (425) 775-5440 EXT. 111

RECEIVED BY _____ DATE_____

PROP. OWNER / DEVELOPER (PRINT NAME) _____

ORIGINAL

Development Guidelines for Sites Adding/Replacing Under 5,000 Square Feet of Impervious Surface

May 2005

Prepared by:

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1. Introduction:

Brier's creeks, streams, and wetlands play an important role in the quality of life for the people who live, work, and play in the Puget Sound region. Many swim, boat, and fish in these waters, and many others enjoy the plants and wildlife these aquatic habitats support. Long before the Puget Sound area was developed, wetlands, meadows and forests supported these aquatic habitats by retaining much of the rainfall and releasing the runoff slowly throughout the year to streams, lakes, and estuaries. As Brier has developed, urban stormwater runoff from decreased vegetation and increased impervious surface has compromised the health of Brier's aquatic resources. In addition, downstream properties may be subject to flooding from increased impervious surface upland. Brier is a small mostly suburban residential community yet even small developments in the small communities are contributing to the degradation of the areas surface water therefore the residents, businesses and agencies are faced with the challenge of protecting the waters that make help to make Brier a desirable place to live.

The City of Brier has adopted the latest version of the Department of Ecology Stormwater Management Manual for this region (the Manual) as the Cities drainage standards per City of Brier Municipal Code 16.16.150(A). This document is intended to supplement the Manual for small sites that are adding and/or replacing under 5,000 square feet of impervious surface. For sites that are adding and/or replacing greater than 5,000 square feet of impervious surface, please consult the Manual for requirements pertinent to the site. This document is intended to provide sufficient information to the applicant to submit a complete application, however there may be some instances where additional requirements may be imposed on the site upon review of the engineer or his authorized agent.

2. Requirements:

The following requirements will be required of all sites proposing the addition and or replacement of impervious areas:

1) ____ **Preparation of a Site Plan**
2) ____ **Construction Stormwater Pollution Prevention Plan**
3) ____ **Preservation of Natural Drainage systems and Outfalls**
4) ____ **On-Site Stormwater Management**

2.1 Requirement Number 1: Preparation of a Site Plan

The Stormwater Site Plan is the comprehensive report containing all of the technical information and analysis necessary to evaluate a proposed new development or redevelopment project for compliance with stormwater requirements. Contents of the Stormwater Site Plan will vary with the type and size of the project, and individual site characteristics

This section discusses the minimum requirements for the site plan. Detailed information regarding construction stormwater pollution prevention, source control, and on-site stormwater management BMPs are explained in further detail in the following sections.

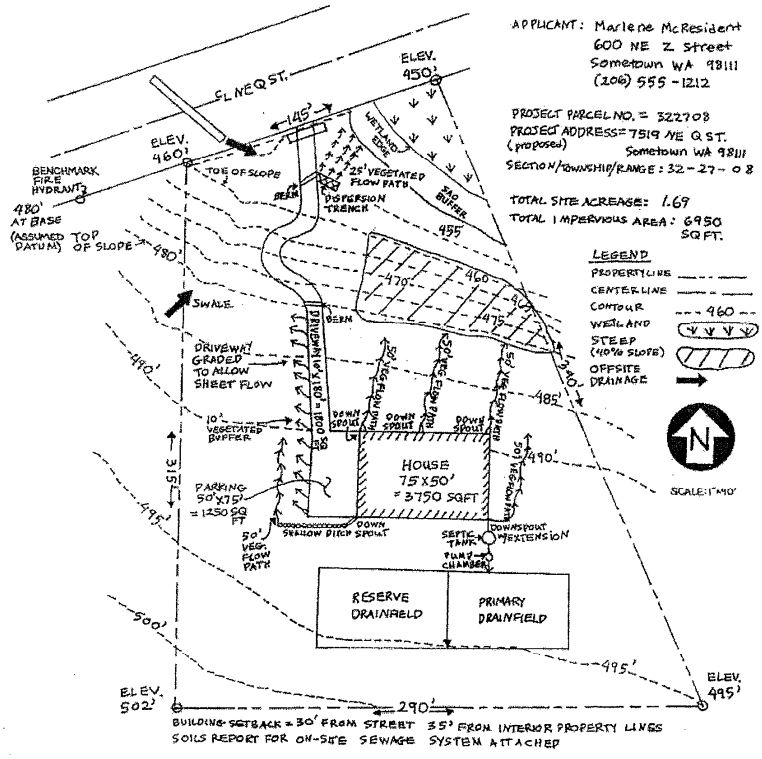
Site Plan Requirements Checklist:

1) ____ Address of Project
2) ____ Owner's name
3) ____ Location and dimensions of all parking areas, driveways and other paved areas (existing and proposed)
4) ____ Identification of adjacent streets (by name), alleys or other adjacent public property
5) ____ Legal Description of the property including any easements and Snohomish County recording numbers of short plats or lot boundary adjustments.
6) ____ Assessor's Parcel Number (property tax account number)
7) ____ North arrow.
8) ____ Identification of the drawing's scale if any.
9) ____ Property lines and property dimensions.
10) ____ Show adjacent properties with land use information.
11) ____ Location, size and shape of any structures presently on the site and of those proposed for construction.
12) ____ Identify existing vegetation.
13) ____ Dimensions showing front, side, and rear distances from building to property lines, distance between structures, size of structures, porches and decks.
14) ____ Dimensions of roof overhangs and other architectural features such as bay windows, chimneys, and gutters.
15) ____ Identification of exactly what work is to be done, including the changes that are proposed to the physical features of the site or existing structures (clearly distinguishing existing from proposed features).
16) ____ Ground elevations or approximate contour lines and contour intervals for new construction or additions on sloping sites or where earth grading is proposed.
17) ____ All streams, wetlands, lakes, closed depressions, or other water feature including any required buffers and set back lines.
18) ____ Locations of all steep slopes, landslide hazard areas, and their buffers and building set back lines.

19) ____ Location of all drainage easements.
20) ____ Location of all existing and proposed ditches, swales, pipes, etc.
21) ____ Type and location of flow control systems that will serve impervious surfaces (dispersion, sheet flow dispersion, infiltration etc.)
22) ____ Location of any vegetated flow paths or buffers required for flow control systems.
23) ____ Setback lengths between flow control systems and any property line, structure, steep slope, stream, wetland or septic system.
24) ____ Delineation of proposed clearing limits
25) ____ Type and location of erosion control facilities
26) ____ Location of any significant offsite drainage features within 200 feet of the discharge point(s) for the lot including streams, lakes, and roadside ditches.
27) ____ Narrative description of proposed project (may be on a separate sheet)
28) ____ Description of proposed on site BMP's shown on the plans (may be on a separate sheet).
29) ____ Any necessary special studies or soils reports.

The plan may be hand drawn on 8 ½" by 11", 8 ½" by 14", 11" by 17" or 22" by 34" paper and must be neat and legible. See sample site plan Figure No. 1.

Figure No. 1
SAMPLE SITE PLAN



2.2 Requirement Number 2: Construction Stormwater Pollution Prevention Plan

This section addresses the planning, design, and implementation of stormwater management activities prior to and during the construction phase of projects. The applicant shall submit a Construction Pollution Prevention Plan as a separate drawing similar to the site plan and/or provide a narrative to explain the measures to be used on site during construction. The objective of this section is to provide guidance for avoiding adverse stormwater impacts from construction activities on downstream resources and on-site stormwater facilities. Minimization of stormwater flows, prevention of soil erosion, capture of water-borne sediment that has been unavoidably released from exposed soils, and protection of water quality from on-site pollutant sources are all readily achievable when the proper Best Management Practices are planned, installed, and properly maintained. The following requirements are for typical small site developments. Additional requirements may be necessary based on individual site conditions. Refer to **Figure 2**, Sample Construction Stormwater Pollution Prevention Plan.

The construction stormwater pollution prevention plan shall address, at minimum, the following:

1) ____ Mark the Clearing Limits
2) ____ Establish Construction Access
3) ____ Control Flow Rates
4) ____ Install Sediment Controls
5) ____ Stabilize Soils
6) ____ Protect Slopes
7) ____ Protect Drain Inlets
8) ____ Stabilize Channels and Outlets
9) ____ Control Pollutants
10) ____ Control Dewatering
11) ____ Maintain BMPs
12) ____ Manage the Project

Mark the Clearing Limits: The clearing limits shall be clearly depicted on the site plan and marked in the field prior to the start of construction. Clearing limits shall be limited to the smallest area possible to minimize disturbance of the natural vegetation and land cover. Sensitive areas and trees to remain shall be protected and remain outside of the clearing limits. Clearing limits shall be marked in the field with high visibility plastic fencing.

Establish Construction Access: The Construction Access location shall be shown on the plans. Should the conditions warrant construction access shall be stabilized with quarry spalls or crushed rock to minimize the tracking of sediment onto public roads (BSP 4-014)

Control Flow Rates: When flow control systems are required the facilities shall be installed prior to any impervious surfaces are constructed.

Install Sediment Controls: Prior to leaving a construction site or prior to discharge to an infiltration facility, stormwater runoff from disturbed shall pass through a sediment removal BMP. Sediment removal BMPs shall be the first stage of grading and shall be functional before other land disturbing activities take place. BMPs include Straw Bale Barrier BSP 4-009, Silt Fence BSP 4-008, and Straw Wattles BSP 4-108.

Stabilize Soils: Exposed and un-worked soils shall be stabilized by application of effective BMPs (**Table 1**) that protect the soil from the erosive forces of raindrops, flowing water, and wind. From October 1 through April 30, no soils shall remain exposed and un-worked for more than 2 days. From May 1 to September 30, no soils shall remain exposed and un-worked for more than 7 days. This stabilization requirement applies to all soils on site, whether at final grade or not. Soils shall be stabilized at the end of the shift before a holiday or weekend if needed based on the weather forecast. Applicable practices include, but are not limited to, temporary and permanent seeding, sodding, mulching (see Figure No. 3), plastic covering C123, erosion control fabrics and matting BSP 4-112 and 4-113, the early application of gravel base on areas to be paved, and dust control. Selected soil stabilization measures shall be appropriate for the time of year, site conditions, estimated duration of use, and the water quality impacts that stabilization agents may have on downstream waters or ground water. Soil stockpiles must be stabilized and protected with sediment trapping measures

Protect Slopes: Stabilize soils on slopes as specified in Stabilize Soils above.

Protect Drain Inlets: Storm drain inlets operable during construction shall be protected so that stormwater runoff does not enter the conveyance system without first being filtered or treated to remove sediment. Inlets should be inspected weekly at a minimum and daily during storm events. Inlet protection devices should be cleaned or removed and replaced before six inches of sediment can accumulate. BSP 4-107: Storm Drain Inlet Protection.

Stabilize Channels and Outlets: All temporary onsite conveyance channels shall be designed and constructed, and stabilized to prevent erosion. Stabilization, including armoring material, adequate to prevent erosion of outlets, adjacent stream banks, slopes and downstream reaches shall be provided at the outlets of all conveyance systems.

Control Pollutants: All pollutants, including waste materials and demolition debris, that occur onsite shall be handled and disposed of in a manner that does not cause contamination of stormwater. Woody debris may be chopped and spread onsite. Cover, containment and protection from vandalism shall be provided for all chemicals, liquid products, petroleum products and non-inert wastes present on the site.

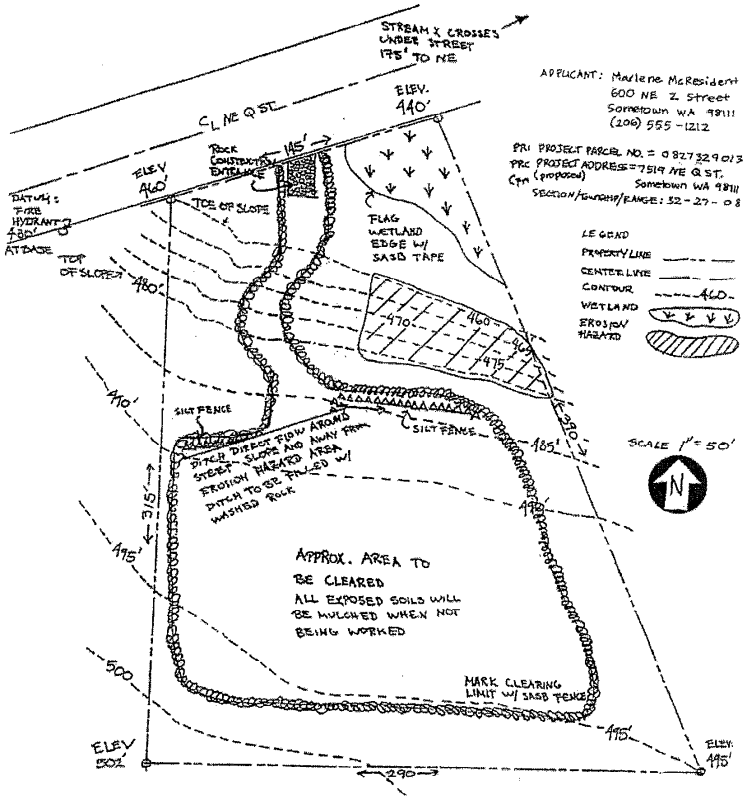
Control Dewatering: Foundation and trench dewatering water shall be discharged to a controlled conveyance system prior to discharge to a sediment trap or sediment pond. Channels must be stabilized, as specified in element number 8.

Maintain BMPs: Temporary and permanent erosion and sediment control BMPs shall be maintained and repaired as needed to assure continued performance of their intended function. Maintenance and repair shall be conducted in accordance with BMPs. Sediment control BMPs shall be inspected weekly or after a runoff producing storm event during the dry season and daily during the wet season. The inspection frequency for stabilized, inactive sites shall be determined by the local permitting authority based on the level of soil stability and potential for adverse environmental impacts. Temporary erosion and sediment control BMPs shall be removed within 30 days after final site stabilization is achieved or after the temporary BMPs are no longer needed. Trapped sediment shall be removed or stabilized on site. Disturbed soil resulting from removal of BMPs or vegetation shall be permanently stabilized.

Table 1
Mulch Standards and Guidelines

Mulch Material	Quality Standards	Application Rates	Remarks
Straw	Air-dried; free from undesirable seed and coarse material.	2"-3" thick; 5 bales per 1000 sf or 2-3 tons per acre	Cost-effective protection when applied with adequate thickness. Hand-application generally requires greater thickness than blown straw. The thickness of straw may be reduced by half when used in conjunction with seeding. In windy areas straw must be held in place by crimping, using a tackifier, or covering with netting. Blown straw always has to be held in place with a tackifier as even light winds will blow it away. Straw, however, has several deficiencies that should be considered when selecting mulch materials. It often introduces and/or encourages the propagation of weed species and it has no significant long-term benefits. Straw should be used only if mulches with long-term benefits are unavailable locally. It should also not be used within the ordinary high-water elevation of surface waters (due to flotation).
Hydromulch	No growth inhibiting factors.	Approx. 25-30 lbs per 1000 sf or 1500 - 2000 lbs per acre	Shall be applied with hydromulcher. Shall not be used without seed and tackifier unless the application rate is at least doubled. Fibers longer than about ¾-1 inch clog hydromulch equipment. Fibers should be kept to less than ¾ inch.
Composted Mulch and Compost	No visible water or dust during handling. Must be purchased from supplier with Solid Waste Handling Permit (unless exempt).	2" thick min.; approx. 100 tons per acre (approx. 800 lbs per yard)	More effective control can be obtained by increasing thickness to 3". Excellent mulch for protecting final grades until landscaping because it can be directly seeded or filled into soil as an amendment. Composted mulch has a coarser size gradation than compost. It is more stable and practical to use in wet areas and during rainy weather conditions.
Chipped Site Vegetation	Average size shall be several inches. Gradations from fines to 6 inches in length for texture, variation, and interlocking properties.	2" minimum thickness	This is a cost-effective way to dispose of debris from clearing and grubbing, and it eliminates the problems associated with burning. Generally, it should not be used on slopes above approx. 10% because of its tendency to be transported by runoff. It is not recommended within 200 feet of surface waters. If seeding is expected shortly after mulch, the decomposition of the chipped vegetation may tie up nutrients important to grass establishment.
Wood-based Mulch	No visible water or dust during handling. Must be purchased from a supplier with a Solid Waste Handling Permit or one exempt from solid waste regulations.	2" thick; approx. 100 tons per acre (approx. 800 lbs. per cubic yard)	This material is often called "hog or hogged fuel." It is usable as a material for Stabilized Construction Entrances (BMP C105) and as a mulch. The use of mulch ultimately improves the organic matter in the soil. Special caution is advised regarding the source and composition of wood-based mulches. Its preparation typically does not provide any weed seed control, so evidence of residual vegetation in its composition or known inclusion of weed plants or seeds should be monitored and prevented (or minimized).

Figure No. 2
SAMPLE CONSTRUCTION STORMWATER POLLUTION PREVENTION PLAN



Manage the Project: Monitoring the BMPs and making updates to the construction SWPPP accordingly if during inspections or investigations conducted by the owner/operator, or the City, it is determined that the SWPPO is ineffective in eliminating or significantly minimizing pollutants in stormwater discharges form the site.

2.3 Requirement Number 3: Preservation of Natural Drainage systems and Outfalls

Natural drainage patterns shall be maintained, and discharges from the project site shall occur at the natural location, to the maximum extent practicable. The manner by which runoff is discharged from the project site must not cause a significant adverse impact to downstream receiving waters and down gradient properties. All outfalls require energy dissipation. The objective of preserving the natural drainage system and outfalls is to preserve and utilize natural drainage systems to the fullest extent because of the multiple stormwater benefits these systems provide; and to prevent erosion at and downstream of the discharge location.

2.4 Requirement Number 4: On Site Stormwater Management

Projects shall employ On-site Stormwater Management BMPs to infiltrate, disperse, and retain stormwater runoff onsite to the maximum extent feasible without causing flooding or erosion impacts.

2.4.1 Roof Downspout Controls

This section presents the criteria for design and implementation of roof downspout controls. Roof downspout controls are simple pre-engineered designs for infiltrating and/or dispersing runoff from roof areas for the purposes of increasing opportunities for groundwater recharge and reduction of runoff volumes from new developments/redevelopments.

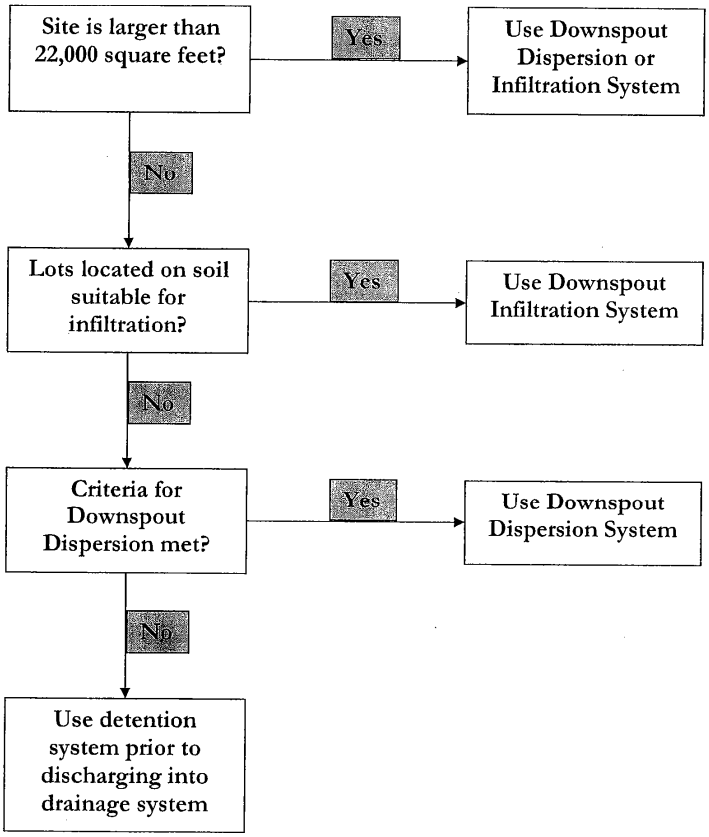
Downspout infiltration should be used in those soils that readily infiltrate (coarse sands and cobbles to medium sands). Dispersion BMPs should be used for urban lots located in less permeable soils, where if infiltration is not feasible. Where dispersion is not feasible because of very small lot size, or where there is a potential for creating drainage problems on adjacent lots, downspouts should be connected to a detention system prior to discharging to the street storm drain system.

Below is a list of the downspout controls in descending order of preference:

- Downspout infiltration systems (Section 2.4.2)
- Downspout dispersion systems (Section 2.4.3)
- Detention Systems (Section 2.4.4)

Figure 3 illustrates, in general, how roof downspout controls are selected and applied for single-family residential projects. Where supported by appropriate soil infiltration tests, downspout infiltration in finer soils may be practical using a larger infiltration system.

Figure No. 3
Flow Diagram Showing Selection of Roof Downspout Controls



2.4.2 Downspout Infiltration Systems

Downspout 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, for example driveways.

Application

The following apply to projects proposing to infiltrate roof runoff:

1. The feasibility or applicability of downspout infiltration must be evaluated for all single-family lots smaller than 22,000 square feet. The evaluation procedure detailed below must be used to determine if downspout infiltration is feasible or whether downspout dispersion can be used in lieu of infiltration.
2. For subdivision single-family lots greater than or equal to 22,000 square feet, downspout infiltration is optional, and the evaluation procedure detailed below may be used if downspout infiltration is being proposed voluntarily.
3. If site-specific tests indicate less than 3 feet of permeable soil from the proposed final grade to the seasonal high groundwater table, then a downspout dispersion system per Section 2.4.3 may be used in lieu of infiltration.
4. On lots or sites with more than 3 feet of permeable soil from the proposed final grade to the seasonal high groundwater table, downspout infiltration is considered feasible if the soils are outwash type soils and the infiltration trench can be designed to meet the minimum design criteria specified below.

Procedure for Evaluating Feasibility

1. A soils report must be prepared by a locally licensed onsite sewage designer or by other suitably trained persons working under the supervision of a professional engineer registered in the State of Washington to determine if soils suitable for infiltration are present on the site. The report must 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. On lots or sites with no outwash type soils, a downspout dispersion system per Section 2.4.3 may be used in lieu of infiltration. On lots or sites containing outwash type soils (coarse sand and cobbles to medium sand), additional site-specific testing must be done. 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 proposed grade), identifying the SCS series of the soil and the USDA textural class of the soil horizon through the depth of the log, and noting any evidence of high groundwater level, such as mottling.

   Note: This testing must also be carried out on lots or sites where downspout infiltration is being proposed in soils other than outwash.

3. If site-specific tests indicate less than 3 feet of permeable soil from the proposed final grade to the seasonal high groundwater table, then a downspout dispersion system per Section 2.4.3 may be used in lieu of infiltration.
4. On lots or sites with more than 3 feet of permeable soil from the proposed final grade to the seasonal high groundwater table, downspout infiltration is considered feasible if the soils are outwash type soils and the infiltration trench can be designed to meet the minimum design criteria specified below.

Design Criteria for Infiltration Trenches

Figure 101 shows a typical downspout infiltration trench system. This system is 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.

Fine sand, loamy sand	75 LF
Sandy loam	125 LF
Loam	190 LF

2. Maximum length of trench must not exceed 100 feet from the inlet sump.
3. Minimum spacing between trench centerlines must be 6 feet.
4. Filter fabric must be placed over the drain rock as shown on Figure 101 prior to backfilling.
5. Infiltration trenches should not be built on slopes steeper than 25 percent (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 steep slope or landslide hazard area.
6. 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.

Design Criteria for Infiltration Drywells

Figure 103 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 groundwater level or impermeable soil layers.
2. If using drywells, each drywell may serve up to 1000 square feet of impervious surface for either medium sands or coarse sands.
3. 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).
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 4 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 slopes greater than 15% without evaluation by a professional engineer with geotechnical expertise or qualified geologist and jurisdiction approval.

Setbacks

Following is a list of set backs for infiltration facilities. Adequate room for maintenance access and equipment should also be considered.

1. All infiltration systems should be at least 10 feet from any structure, property line, or sensitive area (except steep slopes).
2. All infiltration systems must be at least 50 feet from the top of any sensitive area steep slope. 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.

2.4.3 Downspout Dispersion Systems

Downspout dispersion systems are splash blocks or gravel-filled trenches, which serve to spread roof runoff over vegetated pervious areas, see Figures No. 104 and 105. Dispersion attenuates peak flows by slowing entry of the runoff into the conveyance system, allows for some infiltration, and provides some water quality benefits.

Application

Downspout dispersion must be used in all subdivision single-family lots, which meet one of the following criteria:

1. Lots greater than or equal to 22,000 square feet where downspout infiltration is not being provided according to the requirements in Section 2.4.2.
2. Lots smaller than 22,000 square feet where soils are not suitable for downspout infiltration (as determined in Section 2.4.2) and where the design criteria below can be met.

Design Criteria

1. Downspout trenches designed as shown in Figure 104 should be used for all downspout dispersion applications except where splash blocks are allowed.
2. Splash blocks shown in Figure 106 may be used for downspouts discharging to a *vegetated flowpath* at least 50 feet in length as measured from the downspout to the downstream property line, structure, steep slope, stream, wetland, or other impervious surface. Sensitive area buffers may count toward flowpath lengths.
3. If the vegetated flowpath (measured as defined above) is less than 25 feet on a subdivision single-family lot, a detention system per Section 2.4.4 may be used in lieu of downspout dispersion.
4. For sites with septic systems, the discharge point of all dispersion systems must be downgradient of the drainfield. This requirement may be waived if site topography clearly prohibits flows from intersecting the drainfield.

Design Criteria for Dispersion Trenches

1. 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.
2. Trenches serving up to 700 square feet of roof area may be simple 10-foot-long by 2-foot wide gravel filled trenches as shown in Figure 104. For roof areas larger than 700 square feet, a dispersion trench with notched grade board as shown in Figure 105 may be used as approved by the local jurisdiction. The total length of this design must not exceed 50 feet and must provide at least 10 feet of trench per 700 square feet of roof area.
3. A setback of at least 5 feet should be maintained between any edge of the trench and any structure or property line.
4. No erosion or flooding of downstream properties may result.
5. 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 jurisdiction approval.

Design Criteria for Splashblocks

A typical downspout splashblock is shown in Figure 106. 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 apply to the use of splashblocks:

1. A vegetated flowpath of at least 50 feet should be maintained between the discharge point and any property line, structure, steep slope, stream, wetland, lake, or other impervious surface. Sensitive area buffers may count toward flowpath lengths.
2. A maximum of 700 square feet of roof area may drain to each splashblock.
3. A splashblock or a pad of crushed rock (2 feet wide by 3 feet long by 6 inches deep) should be placed at each downspout discharge point.
4. No erosion or flooding of downstream properties may result.
5. Runoff discharged towards landslide hazard areas must be evaluated by a professional engineer with geotechnical expertise or a qualified geologist. Splashblocks may not be placed on or above slopes greater than 20% or above erosion hazard areas without evaluation by a professional engineer with geotechnical expertise or qualified geologist and jurisdiction approval.
6. For sites with septic systems, the discharge point must be downslope of the primary and reserve drainfield areas. This requirement may be waived if site topography clearly prohibits

flows from intersecting the drainfield or where site conditions (soil permeability, distance between systems, etc) indicate that this is unnecessary.

2.4.4 Detention Systems

Detention systems are storage structures such as pipes that store the water collected from the impervious areas during rainfall events and slowly release it through the control structure to the downstream stormwater facility. See Figure No. 107.

Application:

If it is determined that infiltration or dispersion will be an effective means of surface water flow control then the applicant must provide detention to attenuate peak flows.

Design Criteria:

1. The outfall shall be located such that it does not create an erosion or flooding hazard.
2. A setback of 10 feet shall be maintained between the detention system and any structure or property line.
3. Metal pipe is prohibited from for use as detention or conveyance pipe.
4. The following tables should be used in sizing the detention system based on the proposed new and replaced impervious surface area for the project.

Table 2
Detention Pipe Sizes

Impervious Area (sq. ft.)	Required Storage (cu. ft.)	Pipe Length (feet)			
		15"	18"	24"	30"
≤1000	35	24	17	10	7
1500	50	37	26	15	10
2000	65	50	35	20	13
2500	80	63	44	25	16
3000	95	75	53	30	19
3500	110	88	61	35	23
4000	125	100	70	40	26
4500	140	113	79	45	29
5000	160	125	88	50	31

Table 3
Outlet Orifice Sizes

Impermeable Area Sq. Ft.	Outlet Orifice Diameter (Inches)
≤1000	1/2
2000	3/4
2500	3/4
3000	7/8
3500	7/8
4000	1
4500	1
5000	1

Table 4
Rectangular Catch Basin Requirements

Detention Pipe Diameter	Max. Size Knockout	Catch Basin Type
< 18"	20"	Type I, CB
18" to 24"	26"	Type IL, CB
24" to 36"	36"	Type II, CB (48" Basin)
36" to 42"	42"	Type II, CB (54" Basin)

ORIGINAL

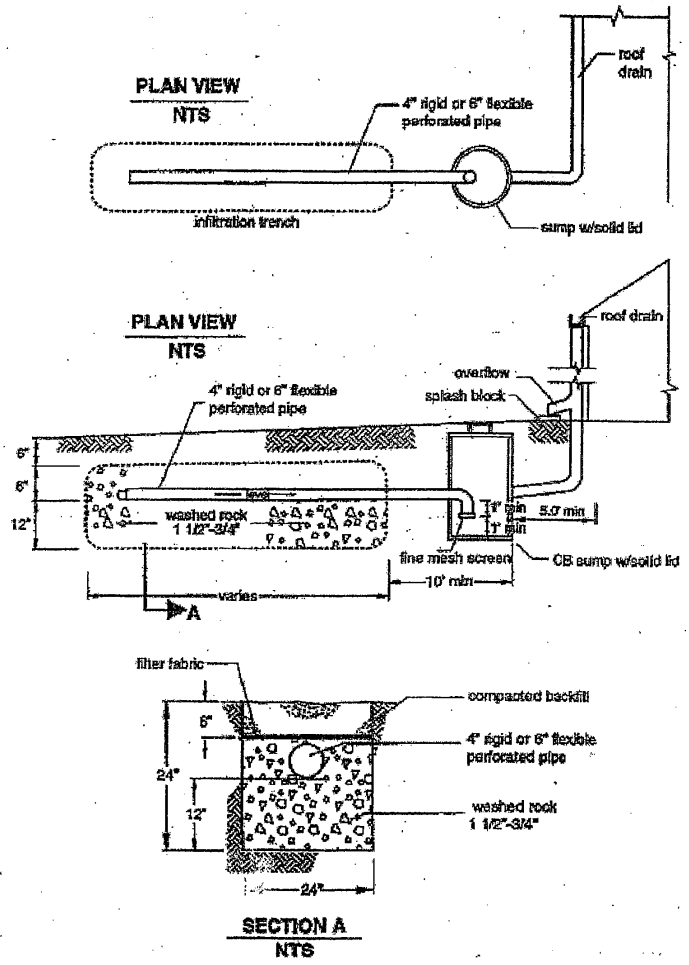
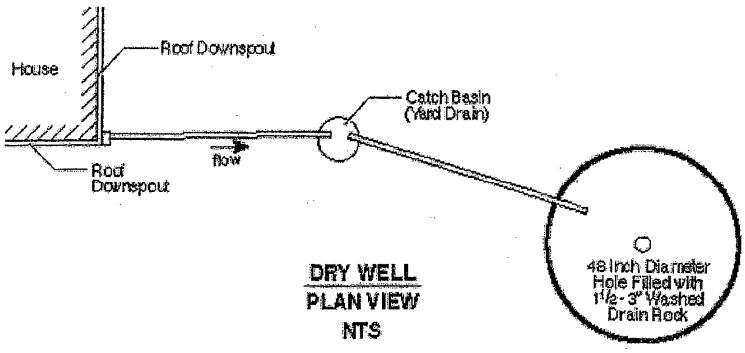
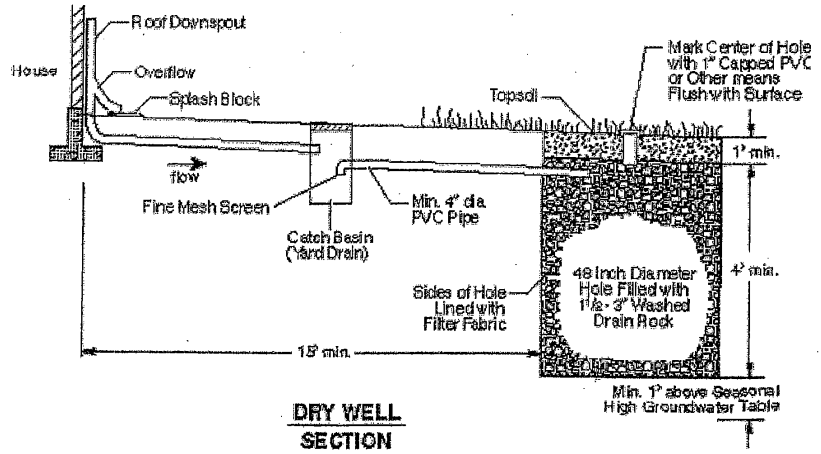


Figure No. 101
Typical Downspout Infiltration System

ORIGINAL

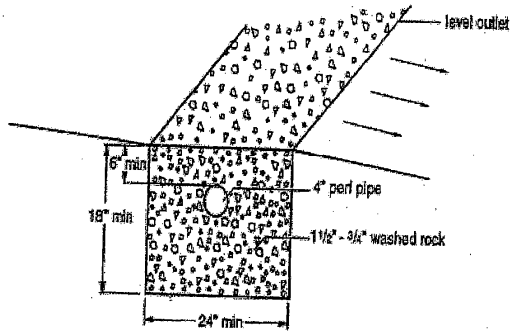


DRY WELL
PLAN VIEW
NTS

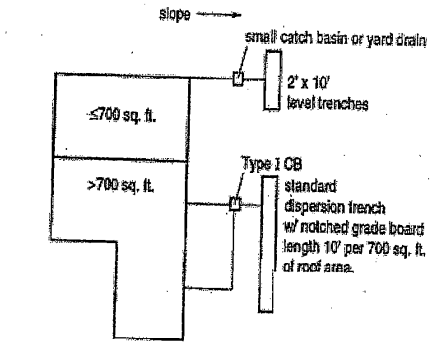


DRY WELL
SECTION
NTS

Figure No. 103
Typical Downspout Infiltration Dry Well



TRENCH X-SECTION
NTS



PLAN VIEW OF ROOF
NTS

Figure No. 104
Typical Downspout Dispersion Trench

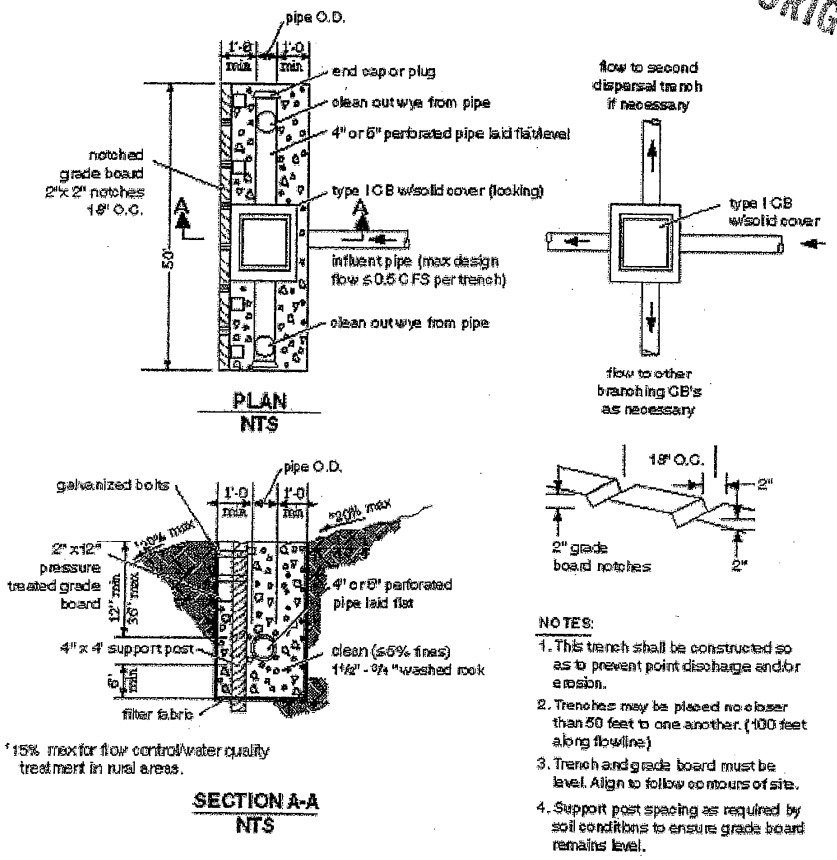


Figure No. 105
Standard Dispersion Trench with Notched Grade Board

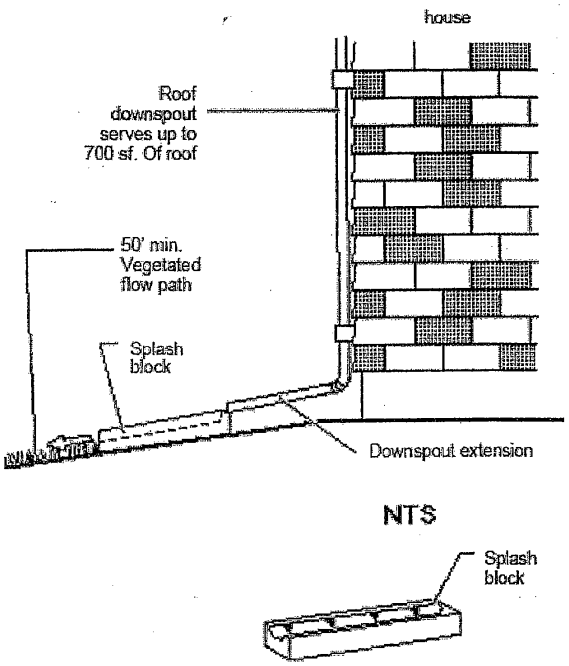
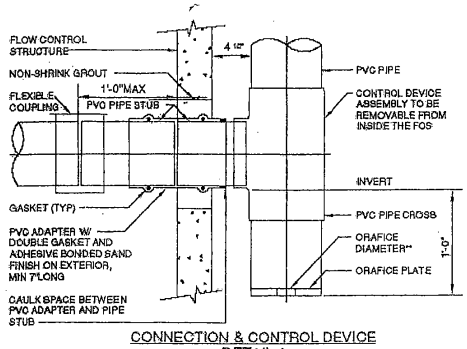
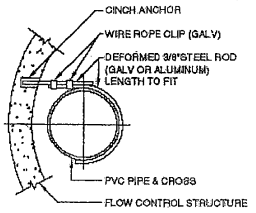


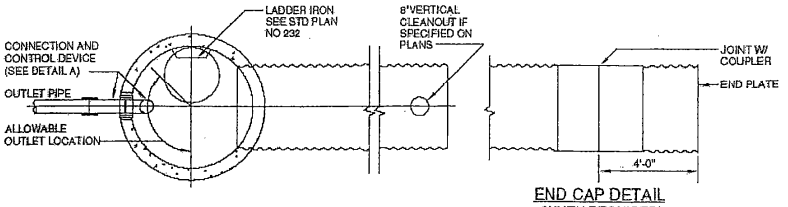
Figure No. 106
Typical Downspout Splashblock Dispersion



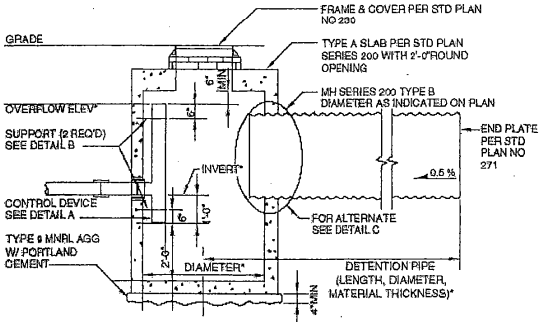
CONNECTION & CONTROL DEVICE
DETAIL A



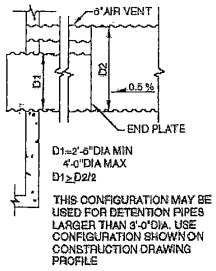
PIPE SUPPORT DETAIL B



END CAP DETAIL
(WHEN REQUIRED)



FLOW CONTROL STRUCTURE & DETENTION PIPE
*SPECIFIC DESIGN INFORMATION AS INDICATED ON CONSTRUCTION DRAWINGS



DETAIL C

NOT TO SCALE

Figure No. 107
Typical Detention System

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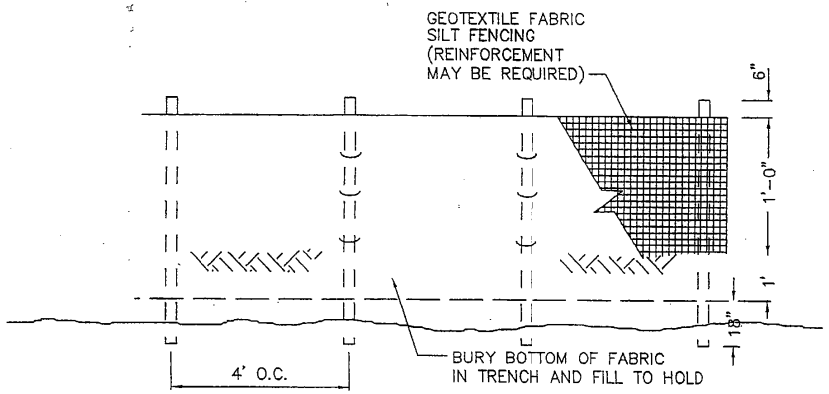
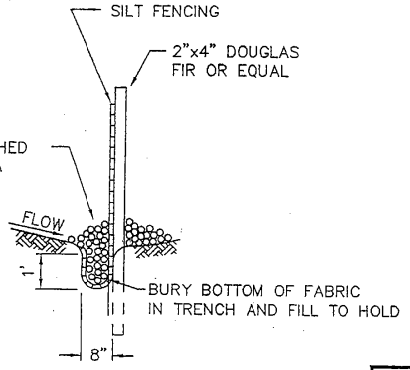
ORIGINAL





NOTE:

1. SEE SECTION 4-080F FOR FABRIC SPECIFICATIONS

CITY OF Brier

SILT FENCE

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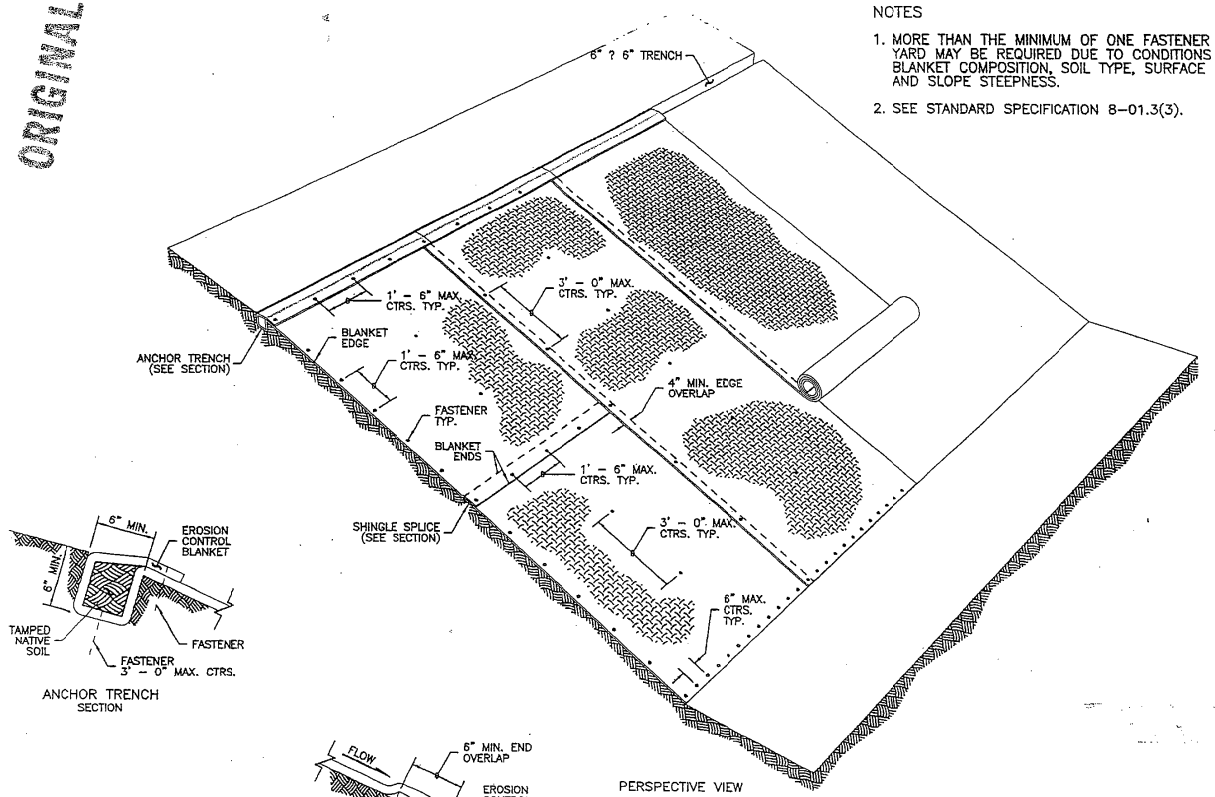
ORIGINAL

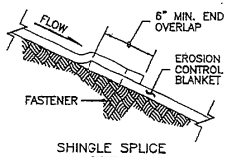
NOTES

1. MORE THAN THE MINIMUM OF ONE FASTENER PER SQUARE YARD MAY BE REQUIRED DUE TO CONDITIONS SUCH AS BLANKET COMPOSITION, SOIL TYPE, SURFACE UNIFORMITY, AND SLOPE STEEPNESS.
2. SEE STANDARD SPECIFICATION 8-01.3(3).



PERSPECTIVE VIEW

ANCHOR TRENCH
SECTION



SHINGLE SPLICE
SECTION

CITY OF Brier

EROSION CONTROL BLANKET PLACEMENT ON SLOPE

DRAFT STANDARD PLAN 4-112

LAST REVISED 11/01/04