HIP Pre-Design Information
Case Study

Calculations are estimates and based on proposed project options. These numbers are subject to change based on final project determination.

Total Parcel Area: 179,423 ft^2

Total Treatable Area: 179,423 ft^2

Minimum 25% treatment: 44,856 ft^2

Soil Information (see attached soil characterization sheets):

- Soil Test #1 – A Soil Drainage Test was completed for this site. No groundwater was found, and the infiltration rate is moderate.
- Soil Test #2 –A Simple Investigation was completed to check for bedrock or groundwater. No bedrock or groundwater was discovered, and infiltration rate is assumed moderate based on information from Soil Test #1.

Proposed BMPs:

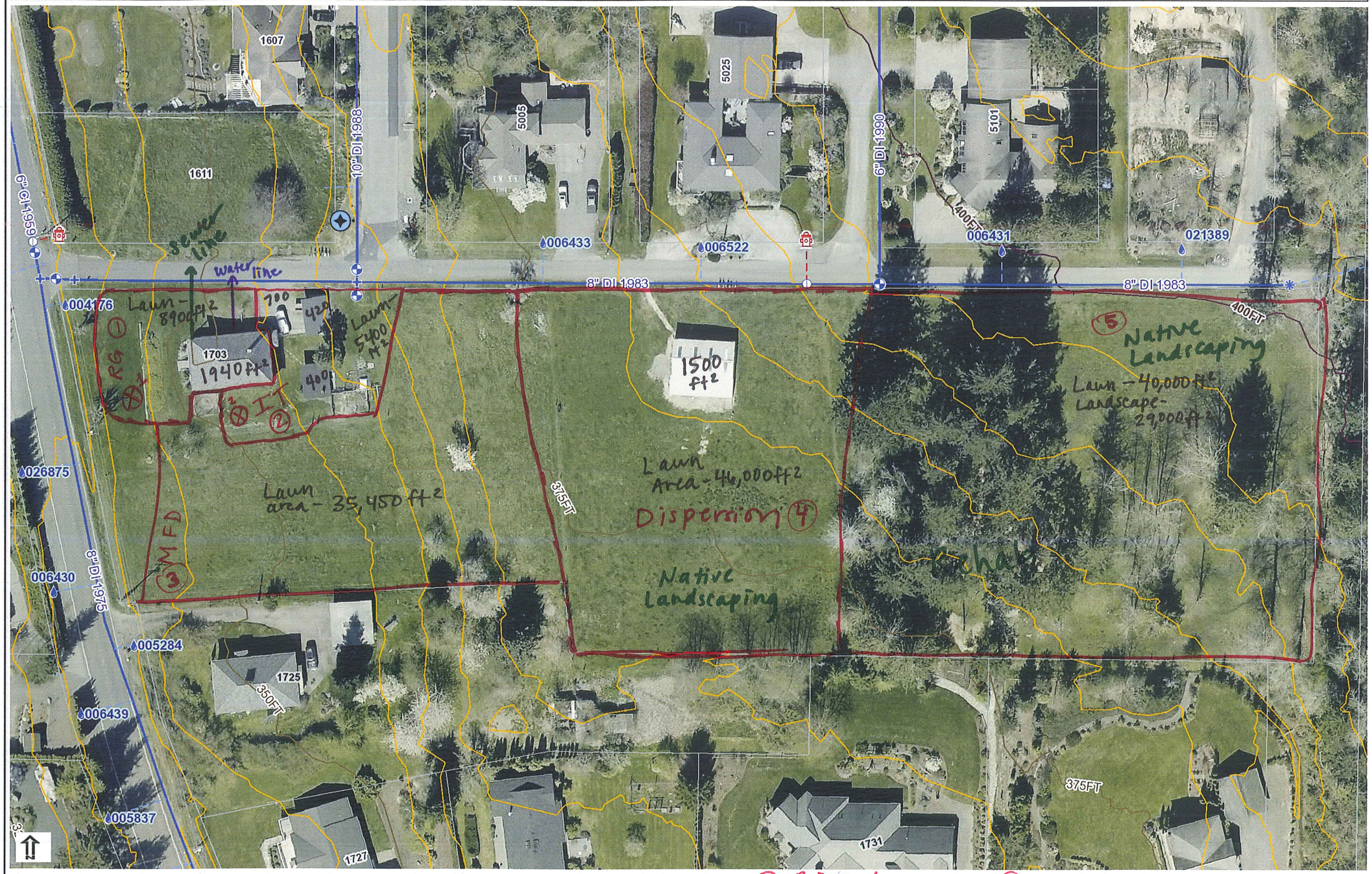
1. Rain Garden treating house roof and lawn
2. Infiltration trench treating driveway, outbuildings & lawn/landscape
3. Media Filter Drain treating lawn
4. Dispersion with native landscaping treating lawn and barn roof
5. Native Landscaping treating lawn and rehab of existing landscape area

Estimated Area to be Treated: 176,000 ft^2

Estimated Budget: $228,800

City of Bellingham WASHINGTON

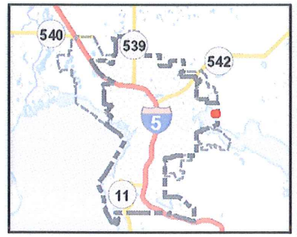
CityIQ Map Pre-Design (See attached information for details)



124 0 62 124 Feet

THIS MAP IS NOT TO BE USED FOR NAVIGATION

① - Rain garden
② Infiltration trench
③ Media Filter Drain
④ Dispersion
⑤ Native landscaping / Rehab
⊗ - Soil test locations



Legend

- Address
- Park Labels
- Water Access Points
- Service Valve
  - Fireline Valve
  - Hydrant Valve
- Fitting
- Control Valve
  - Air Release
  - Blow Off
- Meters
  - Water Customer
  - Critical Water Customer
- Hydrants
  - COB
  - City Filling Station
  - Private Hydrants
- Water System Valve
  - Bypass Valve
  - Inline Valve
  - Tapping Valve
  - Zone Valve
- Network Structure
  - Enclosed Storage Facility
  - Pump Station
  - SamplingStation
  - Storage Basin
  - Treatment Plant
- SamplingStations
- Lateral Line
  - Fireline Service
  - Hydrant Service
  - Water Service Line
- Water Main
  - City Main; Active; Potable
  - City Main; Active; Untreated
  - City Main; Under Construction; Potable
  - Private Main; Active; Potable
  - Private Main; Active; Untreated
- Reservoirs
- Streams
  - Culvert
  - Stormwater Main
  - Stream Centerline
- MTCA Areas (Model Toxic Control Ac
- Site Specific Delineation
- Site Specific Delineation (Add'l)
- Wetlands 2015 Inventory
- Other Inventories
- Wetlands 2003 Inventory
- Wetlands 1992 Inventory
- Tax Parcels
  - <all other values>
  - Care Facility
  - Hospital
  - Schools

Notes

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Soil Characterization Sheet – Soil Test #2(Infiltration)

Step 1. Review available soil data and recommend on-site soil testing
To be completed by HIP Coordinator.

Off-site test pit data. Review map provided by HIP. If one test pit is within 100' of any property line, list only that data. Otherwise, please list three representative test pits, preferably within ¼ mile of the site.

Test Pit Number	Soil Type/ Infiltration Rate	Depth to Groundwater	Depth to Bedrock
NS_PIT_2	.68	4 ft	Greater than 3'
E_North EBV5	.68	2 ft	Greater than 3'
E_North_EBV6	.68	5 ft	Greater than 3'

Based on this information, the recommended soil investigation procedure to follow in Step 2 is (determined by HIP Coordinator):

SIMPLE INVESTIGATION- based on Soil Test #1 Information

Step 2. On-site testing procedure to determine soil type
To be completed by HIP Coordinator or the project designer

Follow the soil testing methods and instructions for infiltration BMPs, found in the HIP Design Handbook (Infiltration Trench and Lake Whatcom Rain Garden).

Note: If designing for infiltration facilities in multiple locations, it is suggested that each location be checked for factors that might affect design considerations. Consult with the HIP Coordinator to determine the number of additional investigations recommended for each unique site.

I completed an on-site soil investigation using (check boxes of all completed tests):

☐ Soil Drainage Test

I used the Rain Garden Manual

After one wet season (or three dry season) tests I have determined that my soil drainage rate is _____ in/hr.

I've characterized my soil as:

- ☐ Good
- ☐ Moderate
- ☐ Marginal
- ☐ Poor

X Simple Investigation

I dug to a depth of 3' below ground surface and found:

- ☐ Groundwater
- ☐ Bedrock
- ☐ Other: _____
  _____
  _____

X None of the above

☐ Soil Texture Test

I used this test method to determine soil type (circle one):

Clay	Clayey Silt
Silt/Loam	Sandy Loam/Sand

I've characterized my soil as:

- ☐ Good
- ☐ Moderate
- ☐ Marginal
- ☐ Poor

Soil Characterization Sheet – Soil Test #1(Rain Garden)

Step 1. Review available soil data and recommend on-site soil testing
To be completed by HIP Coordinator.

Off-site test pit data. Review map provided by HIP. If one test pit is within 100' of any property line, list only that data. Otherwise, please list three representative test pits, preferably within ¼ mile of the site.

Test Pit Number	Soil Type/ Infiltration Rate	Depth to Groundwater	Depth to Bedrock
NS_PIT_2	.68	4 ft	Greater than 3'
E_North EBV5	.68	2 ft	Greater than 3'
E_North_EBV6	.68	5 ft	Greater than 3'

Based on this information, the recommended soil investigation procedure to follow in Step 2 is (determined by HIP Coordinator):

SOIL DRAINAGE TEST

Step 2. On-site testing procedure to determine soil type
To be completed by HIP Coordinator or the project designer

Follow the soil testing methods and instructions for infiltration BMPs, found in the HIP Design Handbook (Infiltration Trench and Lake Whatcom Rain Garden).

Note: If designing for infiltration facilities in multiple locations, it is suggested that each location be checked for factors that might affect design considerations. Consult with the HIP Coordinator to determine the number of additional investigations recommended for each unique site.

I completed an on-site soil investigation using (check boxes of all completed tests):

X Soil Drainage Test

I used the Rain Garden Manual

After one wet season (or three dry season) tests I have determined that my soil drainage rate is 0. 68 in/hr.

I've characterized my soil as:

- ☐ Good
- X Moderate
- ☐ Marginal
- ☐ Poor

☐ Simple Investigation

I dug to a depth of 3' below ground surface and found:

- ☐ Groundwater
- ☐ Bedrock
- ☐ Other: _____
  _____
  _____
- ☐ None of the above

☐ Soil Texture Test

I used this test method to determine soil type (circle one):

Clay	Clayey Silt
Silt/Loam	Sandy Loam/Sand

I've characterized my soil as:

- ☐ Good
- ☐ Moderate
- ☐ Marginal
- ☐ Poor

KEY

HIP

Property Owner: Example
Site Address: 1234 Lake Whatcom Ave.

Submittal Requirements

Part I: Submittal requirements for all HIP projects

- [x] Project Summary & Project Narrative
- [x] Project Site Plan (to scale)
  - [x] Existing Conditions with Utilities, including approximate location of rights-of-way
  - [x] Proposed Improvements (BMP footprint, dimensions, and conveyance)
  - [x] Erosion and Sediment Control Plan (all BMPs except Landscaping BMP)
- [x] Stormwater Pollution Prevention Plan (SWPPP)
- [x] Material Specifications

Part II: Submittal requirements for each primary BMP

Complete all that apply:

- [x] **Native Landscaping**
  - [x] Design Submittal (Sections I-III)
  - [x] Plant Density Calculator
  - [x] Planting Areas Shown on Site Map
  - [x] Planting Plan and HIP Plant List
- [x] **Infiltration Trench**
  - [x] Design Submittal (Sections I-II)
  - [x] Sizing Calculator
  - OR
  - [ ] Alternative Sizing Calculator
  - [x] Facility Cross-Section
- [x] **Media Filter Drain**
  - [x] Design Submittal (Sections I-II)
  - [x] Sizing Calculator
  - OR
  - [ ] Alternative Sizing Calculator
  - [x] Facility Cross-Section

KEY

HIP

Part II (continued)

- [x] **Dispersion**
  - [x] Design Submittal (Sections I-II)
  - OR
    - [x] Sizing Calculator
    - [ ] Alternative Sizing Calculator
    - [x] Facility Cross-Section

- [x] **Lake Whatcom Rain Garden**
  - [x] Design Submittal (Sections I-II)
  - OR
    - [x] Sizing Calculator
    - [ ] Alternative Sizing Calculator
    - [x] Facility Cross-Section
  - [ ] Planting Plan and HIP Plant List

Part III: Submittal requirements specific to the City or County

City Only:

- [ ] City Supplemental Forms

County Only:

- [ ] Whatcom County Permit Application

This project will not trip redevelopment thresholds regarding new or replaced impervious or partially-pervious surfaces. Therefore, this work qualifies for permitting exemptions for phosphorus- or flow-limiting projects as provided by applicable local codes and development

Part IV: Signatures

	Printed Name	Signature	Date
Submittal Completed By:			
On Behalf Of:			

These requirements were developed in accordance with the minimum requirements found in the Stormwater Management Manual for Western Washington and local regulations.

KEY

HIP

Staff Use Only	
City	☐
County	☐
Shoreline	☐

Project Summary

Address: 1234 Lake Whatcom Ave. (*street address*) 98226 (*zip code*) **Parcel #:** 380322000000

Owner Name: John + Jane Example Phone: 360-555-5555 Email: example@gmail.com

HIP Staff: Jenny Coe Phone: 360-306-4701 Email: jcoe@whatcomcd.org

Designer: _____ Phone: _____ Email: _____

Short Description: Installation of five HIP BMPs to address stormwater runoff from private property

Check boxes below to characterize the project:

Best Management Practices	Complementary BMPs	Stormwater Calculations
☑ Native Landscaping	☐ Permeable Paving	☐ None (Landscaping Only)
☑ Infiltration Trench	☐ Rainwater Harvesting	☑ HIP Standard Calculations
☑ Media Filter Drain	☐ Invasive Species Removal	☐ WWHM Modeling
☑ Dispersion	☐ Sand Filter	☐ MGS-Flood Modeling
☑ Lake Whatcom Rain Garden	☐ Other:	☐ Other:

Measurement	Number		Notes
Total Developed Site Area	189,500	ft^2	Existing landscape to be rehabbed
Area Landscaped by Project	108,000	ft^2	" " inc. Dispersion
Area Infiltrated by Project	20,250	ft^2	
Area Dispersed/Treated by Project	53,000	ft^2	
New or Replaced Lawn	∅	ft^2	
New or Replaced Hard Surface	∅	ft^2	
Amount of Soil Excavated	2,270	ft^3	(84 CY)

HIP

KEY

Project Narrative

The following project, located at 1234 Lake Whatcom Waterfront Ave. is proposed as a voluntary stormwater retrofit designed to protect and restore water quality in and around Lake Whatcom. The attached and enclosed information details the proposed phosphorus-reducing best management practices (BMPs) to be installed at the project site.

A summary of these BMPs is as follows:

- BMP#1: Rain Garden
  - This component will be 576 ft² in size.
  - This component addresses 7,800 ft² of site area.
  - Location of BMP relative to house: Front yard.
- BMP#2: Infiltration Trench
  - This component will be 558 ft² in size.
  - This component addresses 12,450 ft² of site area.
  - Location of BMP relative to house: Side yard.
- BMP#3: Media Filter Drain (sheet flow)
  - This component will be 310 ft² in size.
  - This component addresses 31,000 ft² of site area.
  - Location of BMP relative to house: South yard, west of pasture.

If the project contains more than three unique BMPs, additional information must be attached to this project narrative. (Etc...)

Dispersion trench = 232ft², improves 22,000ft²
~~Rain~~ Native Landscape = 86,000ft²

KEY

Material Specifications

Refer to the Material Specification section of the BMP Design Manual for more guidance on this requirement. Based on the project site plan and facility cross-section details, the following material specifications shall be followed to ensure proper function of the systems:

Project proposes to follow Specifications from HIP Spec book, publication date April, 2017, with no exceptions or alternative specs proposed.

KEY

Stormwater Pollution Prevention Plan (SWPPP)

Describe all elements below that apply to your project. Refer to the current edition of the Stormwater Management Manual for Western Washington for drainage project instructions. If you are only completing a landscaping project, describe elements below that you will implement during the winter work season.

Elements of the SWPPP

Element 1 – Mark Clearing Limits:

I will mark clearing limits with orange fencing

Element 2 – Establish Stabilized Construction Access:

Equipment will enter site from North, driving over a quarry spall construction entrance, as shown on plan.

Element 3 – Control Flow Rates:

HIP Projects are not intended to increase flow rates or stormwater discharge volumes by any amount. Therefore, no flow controls are necessary during construction. If point-discharges are created during construction, they will be mitigated by proper installation of sediment controls and will be disconnected at the completion of the project.

Element 4 – Install Sediment Controls:

Silt fencing will be installed as shown on plans

Element 5 – Stabilize Soils:

All disturbed, exposed, stockpiled, or uncovered soil materials will be covered using an approved material (durable tarp, mulch, straw, etc.) during all rain events occurring during construction. Unworked soils that will be left exposed for more than 48 hours will be covered at the end of the last working day prior to that 48-hour duration. All disturbed soils will be covered completely between October 1 and May 30.

Element 6 – Protect Slopes:

No slopes of concern on site.

HIP

KEY

Elements of the SWPPP (continued)

Element 7 – Protect Drain Inlets:

No public or private drain inlets will be affected by project scope of work

Element 8 – Stabilize Channels and Outlets:

No channels or outfalls on site.

Element 9 – Control Pollutants:

No pollution-generating activities in excess of the approved HIP project are allowed. Spills and leaks of fuels, fluids, or chemicals will not be allowed to enter storm systems. Any fuel, fluid, or chemical pollutants entering storm systems, including ditches, must be reported to the City of Bellingham or Whatcom County immediately upon discovery.

Element 10 – Control Dewatering:

Dewatering is not an expected activity related to a HIP project. Trenches, drywells, and other stormwater systems will not be used as sediment traps at any time. If sedimentation occurs, restoration (including dewatering) will not cause the discharge of sediment-laden water from the site by either surface or piped flow.

Element 11 – Maintain BMPs:

All erosion control BMPs will be maintained per manufacturer's recommendations and as directed by HIP, City of Bellingham, or Whatcom County Staff.

Element 12 – Manage the Project:

Work will occur as defined in an approved HIP project plan and per HIP rules and requirements. Contractor will exercise adaptive management to correct any unexpected deficiencies in erosion control efforts, as necessary. Adaptive management strategies may be reviewed by HIP, City of Bellingham, or Whatcom County staff to ensure compliance with applicable rules and regulations.

Element 13 - Protect LID Features:

Features will be protected by placing straw wattles on uphill trench edging and by following "Construction Criteria for Infiltration Facilities" as written on HIP Standard Details.

KEY

Design Submittal

Lake Whatcom Rain Garden

Section I: System and Sizing Summary

☑	I have provided a site plan and facility cross-section. I have defined the area that will drain into the rain garden, by piping or sheet flow.
	The drainage area is 1,800 **ft² of impervious surface and/or** 6,000 **ft² of lawn/landscape**
☑	I have sized the system using approved methodology (HIP Sizing Calculator or stormwater hydrological modeling software) and attached that data.
	The ponding area of the rain garden will be at least 576 **ft² in size.**
☑	I have calculated the number of plants needed for the total rain garden area (square feet of ponding area divided by 16) and completed a plant list.
	I will need to install at least 36 **native plants in my rain garden.**
☑	I have chosen mulch from the HIP-approved mulch list.
	Mulch type: Hog Fuel **Mulch supplier:** Grow Source

Section II: Site-Specific Planning

☑	I have determined that the ponding area is at least 5' from known utilities.
☑	I have determined that the ponding area is at least 10' from structures or property lines.
☑	I have determined that the rain garden is not on a slope >10% or within 10' upgradient of a slope >15% or within 50' upgradient of a slope >35%.
☑	I have developed an erosion control plan for the excavation of the rain garden and completed a site-specific SWPP that is included with this application.

KEY

Sizing Calculator

Lake Whatcom Rain Garden

Step 1: Characterize Soils. Use the flow chart in the design handbook to develop a soils characterization.

A. Off-site test pit data. Review map provided by HIP. If one test pit is within 100' of any property line, list only that data. Otherwise, please list three representative test pits, preferably within ¼ mile of the site.

Test Pit Number	Soil Type/Infiltration Rate	Depth to Groundwater	Depth to Bedrock
1	Loamy Sand / 1.0 in/hr	None found	5 feet
2	Loam / 0.5 in/hr	8 feet	None found

B. On-site testing results

I completed an on-site soil investigation using (check box in corner of all completed tests):

☐ **Soil Drainage Test**

I used the Rain Garden Manual

After one wet season (or three dry season) tests I have determined that my soil drainage rate is _____in/hr.

I've characterized my soil as:

- ☐ Good
- ☐ Moderate
- ☐ Marginal
- ☐ Poor

☑ **Simple Investigation**

I dug to a depth of 3' below ground surface and found:

- ☐ Groundwater
- ☐ Bedrock
- ☐ Other: _____
- ☑ None of the above

☑ **Soil Texture Test**

I used this test method to determine soil type (circle one):

Clay	Clayey Silt
Silt/Loam	Sandy Loam/Sand

I've characterized my soil as:

- ☐ Good
- ☑ Moderate
- ☐ Marginal
- ☐ Poor

KEY

Step 2: Use Sizing Calculator. Input project-specific data into the table below to calculate the size of the facility. Instructions: Choose soil type based on test results in Step 1. Insert amount of hard surface (roof, pavement, gravel) in square feet and amount of lawn and/or landscape area in square feet. Determine multipliers by using the table below and calculate required ponding area.

Soil Type	Impervious Surface (square feet)	Hard Surface Multiplier (Varies)*	Lawn/Landscape (square feet)	Lawn/LS Multiplier (Varies)*	Ponding Area Minimum (square feet)**
Good					
Moderate	(1,800	0.12) +	(6,000	0.06) =	576
Marginal		210		360	
Poor	Infiltration Not Recommended. Use Treatment, Dispersion, or Native Landscaping BMPs				

*Use multiplier reference table below.

** The ponding area is defined as the area that will be flooded before the system overflows. All rain gardens will have side slopes extending at least 18" from the top of this ponding area in all directions. See Design Guidance for more details and examples.

MULTIPLIER REFERENCE TABLE
RAIN GARDEN SIZING

	Multiplier by Soil Type		
	Good	Moderate	Marginal
Hard Surface Area			
Less than 5,000 sf	0.09	(0.12)	0.15
More than 5,000 sf	0.07	0.09	0.12
Lawn/Landscape Area			
Less than 2,000 sf	0.05	0.07	0.10
Between 2,000-10,000 sf	0.04	(0.06)	0.08
Between 10,000 - 40,000 sf	0.03	0.05	0.07
More than 40,000 sf	0.02	0.04	0.06

Soil Characterization Sheet – Soil Test #1(Rain Garden)

Step 1. Review available soil data and recommend on-site soil testing
To be completed by HIP Coordinator.

Off-site test pit data. Review map provided by HIP. If one test pit is within 100' of any property line, list only that data. Otherwise, please list three representative test pits, preferably within ¼ mile of the site.

Test Pit Number	Soil Type/ Infiltration Rate	Depth to Groundwater	Depth to Bedrock
NS_PIT_2	.68	4 ft	Greater than 3'
E_North EBV5	.68	2 ft	Greater than 3'
E_North_EBV6	.68	5 ft	Greater than 3'

Based on this information, the recommended soil investigation procedure to follow in Step 2 is (determined by HIP Coordinator):

SOIL DRAINAGE TEST

Step 2. On-site testing procedure to determine soil type
To be completed by HIP Coordinator or the project designer

Follow the soil testing methods and instructions for infiltration BMPs, found in the HIP Design Handbook (Infiltration Trench and Lake Whatcom Rain Garden).

Note: If designing for infiltration facilities in multiple locations, it is suggested that each location be checked for factors that might affect design considerations. Consult with the HIP Coordinator to determine the number of additional investigations recommended for each unique site.

I completed an on-site soil investigation using (check boxes of all completed tests):

X Soil Drainage Test

I used the Rain Garden Manual

After one wet season (or three dry season) tests I have determined that my soil drainage rate is 0. 68 in/hr.

I've characterized my soil as:

- ☐ Good
- X Moderate
- ☐ Marginal
- ☐ Poor

☐ Simple Investigation

I dug to a depth of 3' below ground surface and found:

- ☐ Groundwater
- ☐ Bedrock
- ☐ Other: _____
  _____
  _____
- ☐ None of the above

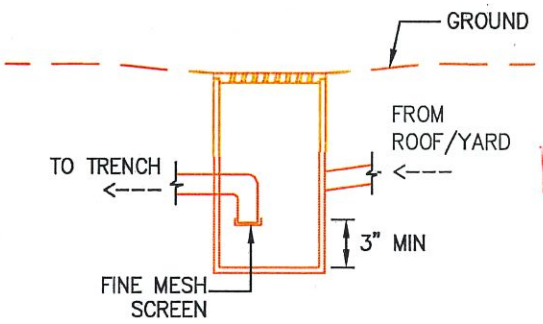
☐ Soil Texture Test

I used this test method to determine soil type (circle one):

Clay	Clayey Silt
Silt/Loam	Sandy Loam/Sand

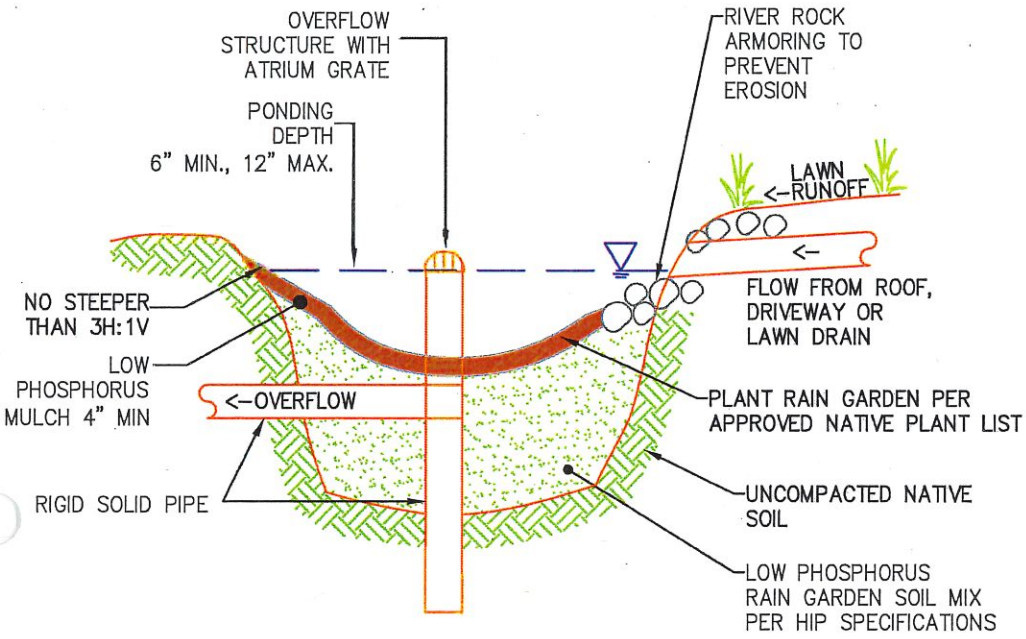
I've characterized my soil as:

- ☐ Good
- ☐ Moderate
- ☐ Marginal
- ☐ Poor



KEY

JUNCTION BOX



SECTION VIEW

LAKE WHATCOM RAIN GARDEN
HIP BMP "E" TYPICAL NTS

Construction Criteria for Infiltration Facilities

Initial basin excavation should be conducted to within 1–foot of the final elevation of the basin floor. Excavate infiltration trenches and basins to final grade only after all disturbed areas in the upgradient project drainage area have been permanently stabilized. The final phase of excavation should remove all accumulation of silt in the infiltration facility before putting it in service. After construction is completed, prevent sediment from entering the infiltration facility by first conveying the runoff water through an appropriate pretreatment system such as a pre–settling basin, wet pond, or sand filter.

Infiltration facilities should generally not be used as temporary sediment traps during construction. If an infiltration facility is to be used as a sediment trap, it must not be excavated to final grade until after the upgradient drainage area has been stabilized. Any accumulation of silt in the basin must be removed before putting it in service.

Traffic Control Relatively light–tracked equipment is recommended for this operation to avoid compaction of the basin floor. The use of draglines and trackhoes should be considered for constructing infiltration basins. The infiltration area should be flagged or marked to keep heavy equipment away.

KEY

Design Submittal
Infiltration Trench

Section I: System and Sizing Summary

☑	I have defined the area that will drain into the infiltration trench, by piping or sheet flow and have provided a site plan and facility cross-section.
	The drainage area is 1,200 ft² of impervious surface and/or 11,250 ft² of lawn/landscape
☑	I have sized the trench using approved methodology (HIP Sizing Calculator or stormwater hydrological modeling software) and attached that data.
	The trench will be at least 558 ft² in size and at least 1.5' (18 inches) deep.
☑	I have calculated the amount of rock needed to fill the trench (cubic feet of trench volume ÷ 27).
	I will need to install at least 31 yd³ of drain rock.

Section II: Site-Specific Planning

☑	I have determined that the trench is at least 5' from known public and private utilities.
☑	I have determined that the trench is at least 5' from structures with slab-on-grade foundations and 10' from structures with a basement or crawl space.
☑	I have determined that the trench is not on a slope steeper than 10% and not within 10' upgradient of a slope steeper than 15% and not within 50' upgradient of a slope steeper than 35%.
☑	I have developed an erosion control plan for the excavation of the trench and completed a site-specific SWPPP that is included with this application.

KEY

Sizing Calculator
Infiltration Trench

Step 1: Characterize Soils. Use the flow chart in the design handbook to develop a soils characterization.

A. Off-site test pit data. Review map provided by HIP. If one test pit is within 100' of any property line, list only that data. Otherwise, please list three representative test pits, preferably within ¼ mile of the site.

Test Pit Number	Soil Type/ Infiltration Rate	Depth to Groundwater	Depth to Bedrock
1	loamy sand / 1.0 in/hr	None found	5 feet
2	loam / 0.5 in/hr	8 feet	None found

B. On-site testing results

I completed an on-site soil investigation using (check boxes of all completed tests):

☐ Soil Drainage Test

I used the Rain Garden Manual

After one wet season (or three dry season) tests I have determined that my soil drainage rate is _____in/hr.

I've characterized my soil as:

- ☐ Good
- ☐ Moderate
- ☐ Marginal
- ☐ Poor

☑ Simple Investigation

I dug to a depth of 3' below ground surface and found:

- ☐ Groundwater
- ☐ Bedrock
- ☐ Other: _____
- ☑ None of the above

☑ Soil Texture Test

I used this test method to determine soil type (circle one):

Clay	Clayey Silt
Silt/Loam	(Sandy Loam/Sand)

I've characterized my soil as:

- ☐ Good
- ☑ (Moderate)
- ☐ Marginal
- ☐ Poor

Step 2: Use Sizing Calculator. Input project-specific data into the table below to calculate the size of the facility.

Instructions: Choose soil type based on test results in Step 1. Measure the amount of hard surface (roof, pavement, gravel) in square feet and amount of lawn and/or landscape area in square feet and insert values into table below. Use multipliers below to calculate required trench area.

Soil Type	Hard Surface (square feet)	Hard Surface Multiplier	Lawn/Landscape (square feet)	Lawn/LS Multiplier	Trench Minimum (square feet)
Good		0.06		0.02	
Moderate	(1,200	0.09	11,250)	0.04	558
Marginal		0.12		0.06	
Poor	Infiltration Not Recommended. Use Media Filter Drain or Dispersion BMPs.				

100 450

Soil Characterization Sheet – Soil Test #2(Infiltration)

Step 1. Review available soil data and recommend on-site soil testing
To be completed by HIP Coordinator.

Off-site test pit data. Review map provided by HIP. If one test pit is within 100' of any property line, list only that data. Otherwise, please list three representative test pits, preferably within ¼ mile of the site.

Test Pit Number	Soil Type/ Infiltration Rate	Depth to Groundwater	Depth to Bedrock
NS_PIT_2	.68	4 ft	Greater than 3'
E_North EBV5	.68	2 ft	Greater than 3'
E_North_EBV6	.68	5 ft	Greater than 3'

Based on this information, the recommended soil investigation procedure to follow in Step 2 is (determined by HIP Coordinator):

SIMPLE INVESTIGATION- based on Soil Test #1 Information

Step 2. On-site testing procedure to determine soil type
To be completed by HIP Coordinator or the project designer

Follow the soil testing methods and instructions for infiltration BMPs, found in the HIP Design Handbook (Infiltration Trench and Lake Whatcom Rain Garden).

Note: If designing for infiltration facilities in multiple locations, it is suggested that each location be checked for factors that might affect design considerations. Consult with the HIP Coordinator to determine the number of additional investigations recommended for each unique site.

I completed an on-site soil investigation using (check boxes of all completed tests):

☐ Soil Drainage Test

I used the Rain Garden Manual

After one wet season (or three dry season) tests I have determined that my soil drainage rate is _____ in/hr.

I've characterized my soil as:

- ☐ Good
- ☐ Moderate
- ☐ Marginal
- ☐ Poor

X Simple Investigation

I dug to a depth of 3' below ground surface and found:

- ☐ Groundwater
- ☐ Bedrock
- ☐ Other: _____
  _____
  _____

X None of the above

☐ Soil Texture Test

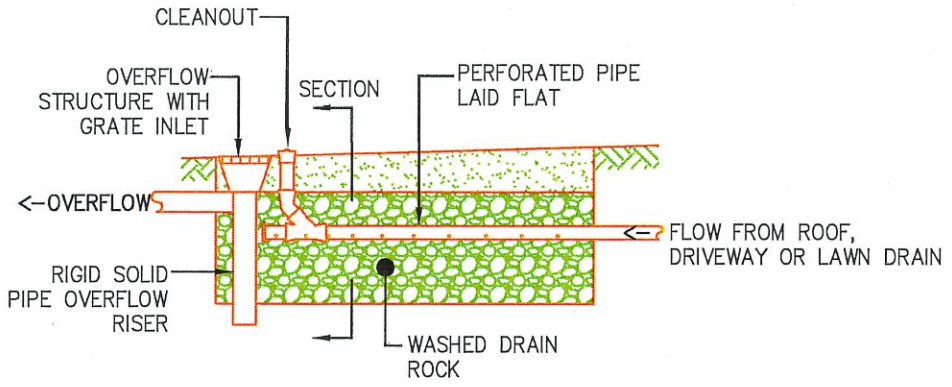
I used this test method to determine soil type (circle one):

Clay	Clayey Silt
Silt/Loam	Sandy Loam/Sand

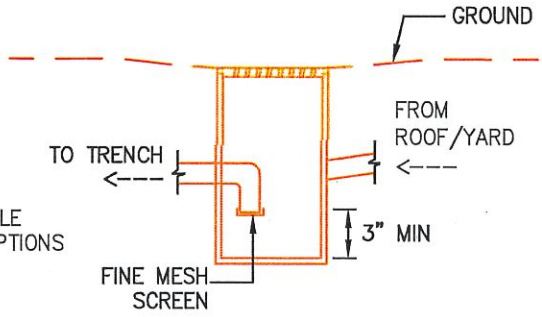
I've characterized my soil as:

- ☐ Good
- ☐ Moderate
- ☐ Marginal
- ☐ Poor

KEY



PROFILE VIEW



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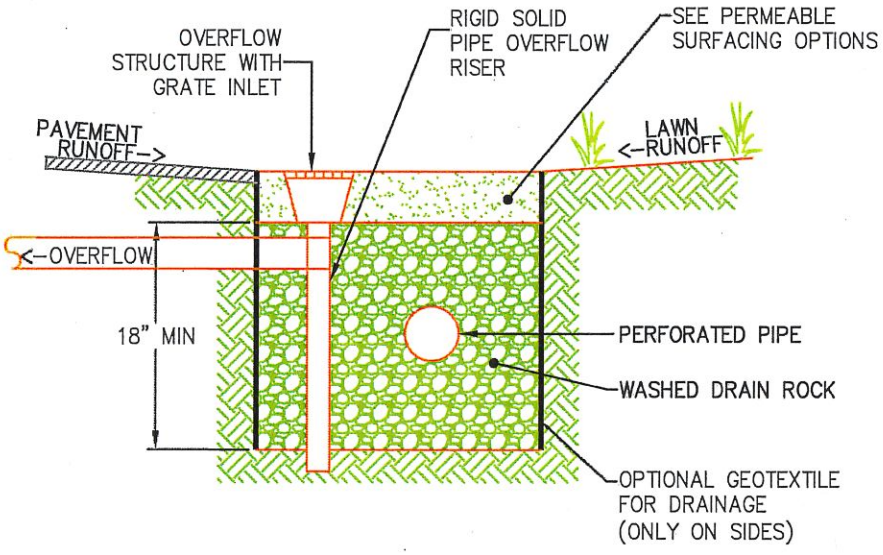


SECTION VIEW

ROCK-FILLED INFILTRATION TRENCH

HIP BMP "B" TYPICAL NTS

Construction Criteria for Infiltration Facilities

Initial basin excavation should be conducted to within 1-foot of the final elevation of the basin floor. Excavate infiltration trenches and basins to final grade only after all disturbed areas in the upgradient project drainage area have been permanently stabilized. The final phase of excavation should remove all accumulation of silt in the infiltration facility before putting it in service. After construction is completed, prevent sediment from entering the infiltration facility by first conveying the runoff water through an appropriate pretreatment system such as a pre-settling basin, wet pond, or sand filter.

Infiltration facilities should generally not be used as temporary sediment traps during construction. If an infiltration facility is to be used as a sediment trap, it must not be excavated to final grade until after the upgradient drainage area has been stabilized. Any accumulation of silt in the basin must be removed before putting it in service.

Traffic Control Relatively light-tracked equipment is recommended for this operation to avoid compaction of the basin floor. The use of draglines and trackhoes should be considered for constructing infiltration basins. The infiltration area should be flagged or marked to keep heavy equipment away.

KEY

Design Submittal
Media Filter Drain System

Section I: System and Sizing Summary

☑	I have provided a site plan and facility cross-section.
☑	I have defined the area that will drain into the MFD by piping.
	That area is Ø **ft² of impervious surface and/or** Ø **ft² of lawn/landscape**
☑	I have defined the area that will drain into the MFD by sheet flow.
	That area is Ø **ft² of impervious surface and/or** 31,000 **ft² of lawn/landscape**
☑	I have sized the MFD using approved methodology (HIP Sizing Calculator or stormwater hydrological modeling software) and attached that data.
	My trench will need to be at least 2 **feet wide and** 310 **ft² in filter area**

Section II: Site-Specific Planning

☑	I have determined that the MFD is at least 5' from known public and private utilities.
☑	I have determined that the MFD is at least 5' from structures with slab-on-grade foundations and 10' from structures with a basement or crawl space.
☑	I have determined that the MFD is not on or next to a slope steeper than 15% and not within 50' upgradient of a slope steeper than 35%.
☑	I have developed an erosion control plan for the excavation of the trench and completed a site-specific SWPPP that is included with this application.

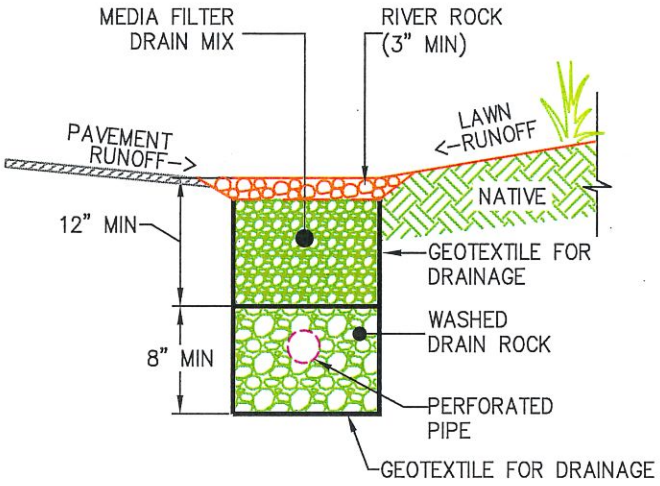
KEY

Sizing Calculator
Media Filter Drain System

Instructions: Measure hard surface area and lawn/landscaping surface area draining to trench. Characterize flow as sheet flow or piped flow. Insert values in the table below and use the following formula to calculate the size of MFD trench that is needed to adequately manage the runoff directed to the system. Sheet flow trenches must be at least 2' wide while piped flow trenches must be at least 3' wide in order for this calculation to be applicable. Runoff from a pipe that crosses at least 25' of lawn or landscape before reaching the trench can be considered sheet flow.

Drainage Type	Hard Surface (square feet)		Hard Surface Multiplier		Lawn/Landscape (square feet)		Lawn/LS Multiplier		Minimum Trench Area (square feet)
Sheet Flow	Ø	×	0.03	+	(31,000	×	0.01	) =	310
Piped Flow	Ø	×	0.04	+	Ø	×	0.01	=	0
Total area of trench needed (add trench areas above):									

KEY



SECTION VIEW

MEDIA FILTER DRAIN ; SHEET FLOW CONFIGURATION
HIP BMP "C.1", TYPICAL NTS

KEY

HIP

Design Submittal
Dispersion

Section I: System and Sizing Summary

☑	I have provided a site plan and facility cross-section.
☑	I have defined the area that will drain into the trench by piping.
	The drainage area is Ø **ft² of impervious surface and/or** Ø **ft² of lawn/landscape**
☑	I have defined the area that will drain into the trench by sheet flow
	That area is 1,500 **ft² of impervious surface and/or** 20,500 **ft² of lawn/landscape**
☑	I have sized the trench using approved methodology (HIP Sizing Calculator or stormwater hydrological modeling software) and attached that data.
	The trench will be at least 116 **feet long and the downstream vegetated flow path must be at least that wide and** 53 **feet long.**

Section II: Site-Specific Planning

☑	I have determined that the trench is at least 5' from known private or public utilities.
☑	I have determined that the trench is at least 5' from structures with slab-on-grade foundations and 10' from structures with a basement or crawl space.
☑	I have determined that the trench is not on or next to a slope steeper than 15% and not within 50' upgradient of a slope steeper than 35%.
☑	I have developed an erosion control plan for the excavation of the trench and completed a site-specific SWPPP that is included with this application.

HIP

KEY

Sizing Calculator
Dispersion

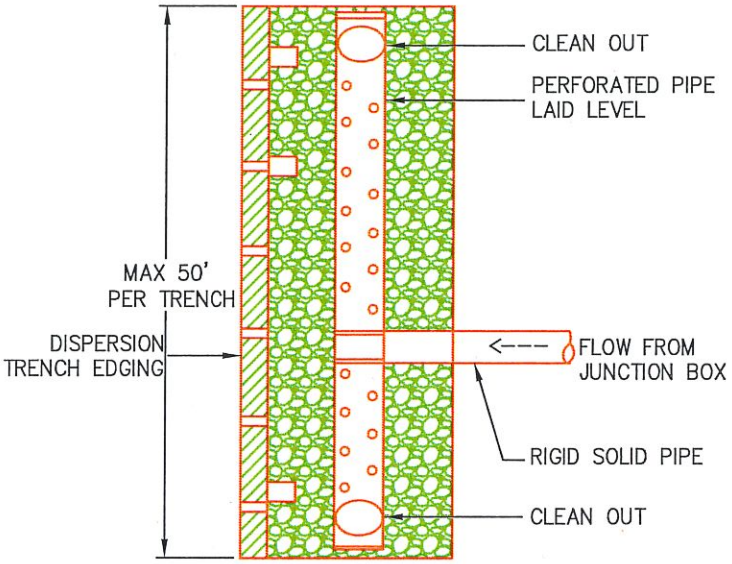
Step 1: Determine Trench Length. Measure the hard surface area draining to the trench. Measure the lawn/landscaping surface area draining to the trench. Use the following formula to calculate the length of dispersion trench that is needed to adequately mange the runoff directed to the system. All dispersion trenches are 2' wide at minimum. Runoff from a pipe that crosses at least 25' of lawn or landscape before reaching the trench can be considered sheet flow.

Drainage Type	Impervious Surface (square feet)	Hard Surface Multiplier	Lawn/Landscape (square feet)	Lawn/LS Multiplier	Minimum Trench Length (linear feet)
Sheet Flow	(1500	0.009	) + (20,500	0.005) =	116
Piped Flow	Ø	0.014 13.5	+ Ø	0.005 10a5 =	Ø
Total length of trench needed (add trench lengths above):					116

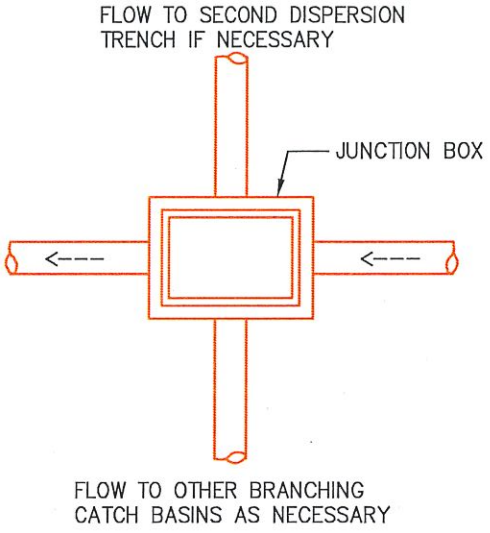
Step 2: Determine Flow Path Length. Use the following formula to calculate how far the dispersed water must travel, through vegetation, before it leaves your property or enters a water body. Runoff from a pipe that crosses at least 25' of lawn or landscape before reaching the trench can be considered sheet flow.

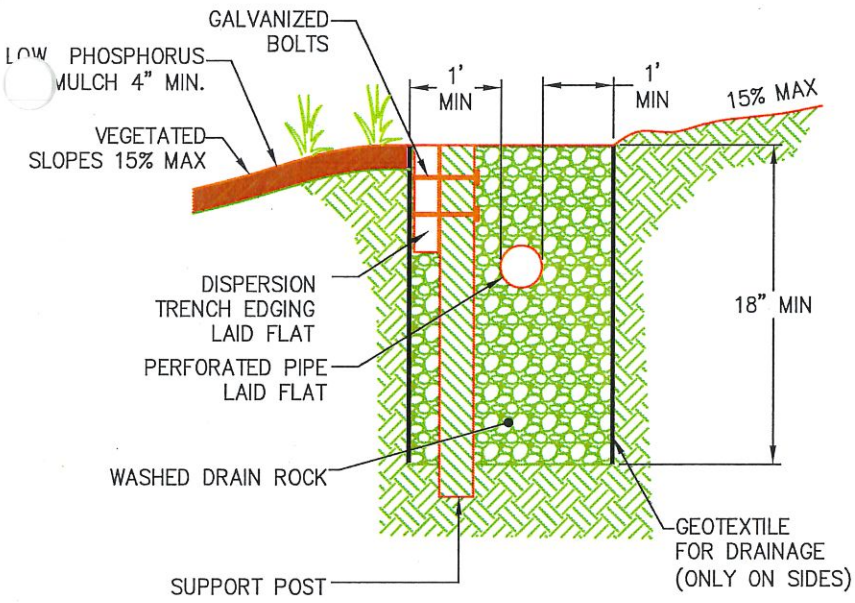
Drainage Type	Hard Surface (square feet) "A"	Lawn/Landscape (square feet) "B"	Lawn Width "C"	Formula	Minimum Flow Path Length (linear feet)
Sheet Flow	Not part of formula	Not part of formula	110'	((C-25)/3)+25	53'
Piped Flow	Ø	Ø	Not part of formula	((A/B)*100)+25	0'
Total length of flow path needed (add flow path lengths above):					53'

KEY

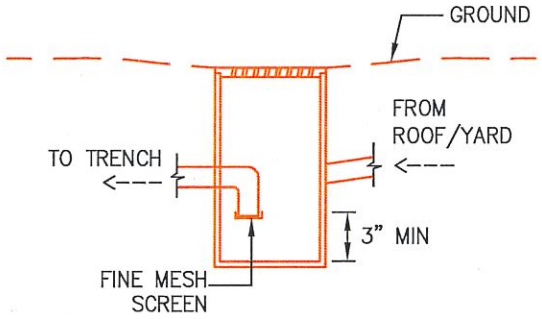


PLAN VIEW





SECTION VIEW



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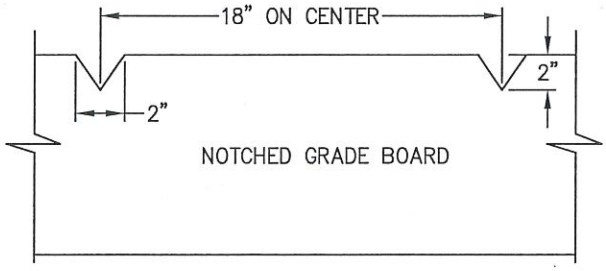


DISPERSION TRENCH EDGING

DISPERSION TRENCH
HIP BMP "D" TYPICAL

NTS

KEY

Design Submittal
Native Landscaping

Section I: System and Sizing Summary

☑	I have defined the area that will be converted into native landscaping and have provided a site map showing the planting area.
	The area is currently Ø **ft² of impervious surface and/or** 86,000 **ft² of lawn/existing landscape**
☑	If any of my planting is in the public right-of-way, I have received written approval from the jurisdiction that manages the public area (City or County).
	The size of the area of the Right-of-Way I plan to landscape is Ø **ft²**
☑	I have calculated the amount of lake-friendly mulch (area divided by 80) and number of native plants (varies) I will need to install to complete the project.
	My landscaping plan requires 1,075 **cubic yards of approved mulch, and my plant list includes** 300 **native trees,** 1,094 **native shrubs, and** 2,440 **native groundcovers**

Section II: Site-Specific Planning

☑	I have determined that I will not be planting trees or shrubs within 5' of a known utility, including septic systems (on private property) or 10' from a utility (in public ROW).
☑	I have determined that I will not need additional approvals for planting trees in the public right-of-way (if proposed, tree planting in ROW is not required)
☑	I have determined that the planting area is not on or next to a slope steeper than 35%
☑	I have developed a plan to prevent erosion or runoff during my planting activities, including work during the wet season that complies with winter work provisions

KEY

Plant Density Calculator

Native Landscaping

Instructions: Choose and circle at least **two** of the following plant layers that will be included in this project. Use the corresponding planting option in the plant density calculator below to determine the number of plants needed for each plant layer.

CANOPY (Native Trees) **UNDERSTORY** (Native Shrubs) **GROUNDCOVER** (Small Native Plants)

Option	Canopy Layers Included	Plant Layer	Project area (sq ft)		Density Divider		Number of Plants
A	Canopy, Understory, and Groundcover	Trees	86,000	÷	225 (15' o.c.*)	=	300
		Shrubs	86,000	÷	64 (8' o.c.)	=	1,094
		Groundcovers	86,000	÷	25 (5' o.c.)	=	2,440
B	Canopy and Understory Only (No Groundcovers)	Trees		÷	144 (12' o.c.)	=	
		Shrubs		÷	36 (6' o.c.)	=	
C	Canopy and Groundcovers Only (No Understory)	Trees		÷	144 (12' o.c.)	=	
		Groundcovers		÷	16 (4' o.c.)	=	
D	Understory and Groundcovers Only (No Canopy)	Shrubs		÷	49 (7' o.c.)	=	
		Groundcovers		÷	25 (5' o.c.)	=	

See Attached

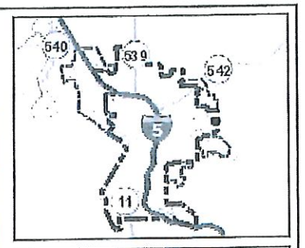
*The abbreviation "o.c." stands for "on center", a convention used to describe the average distance between plants. For example, a tree that is planted 15' o.c. would be, on average, 15' from its nearest neighbor.

CASE STUDY / EXAMPLE

City of Bellingham WASHINGTON

HIP: PROPOSED IMPROVEMENTS
Total Improvable Area = 189,500ft²
Proposed Improved = 181,250ft²

Max Reimb: $235,625.00



Legend

- Catch Basins
- Manhole
- Clean Out
- Pipe End
- Fitting
- Lateral Line
  - Collector
  - Drain Line
  - Storm Service Line
- Culvert
- Storm Main
  - City Mains, Active
  - City Mains, Under Construction
  - Private Mains, Active
  - Private Mains, Under Construction
- Ditch
- Storm Access Points
  - Access Cover
  - Observation Well
- Storm Control Structures
- Storm Other Components
  - COB - Public Works
- Open Channel Streams
- Water Access Points
- Service Valve
  - Fireline Valve
  - Hydrant Valve
- Fitting
- Control Valve
  - Air Release
  - Blow Off
- Customer
  - Water Customer
  - Critical Water Customer
- Hydrants
  - City Hydrants
  - City Filling Station
  - Private Hydrants
- Water System Valve
  - Bypass Valve
  - Inline Valve
  - Tapping Valve
  - Zone Valve
- Network Structure
  - Enclosed Storage Facility
  - Pump Station
  - SamplingStation
  - Storage Basin
  - Treatment Plant
- SamplingStations
- Lateral Line
  - Fireline Service
  - Hydrant Service
  - Water Service Line
- Water Main
  - City Mains Active Potable

Notes

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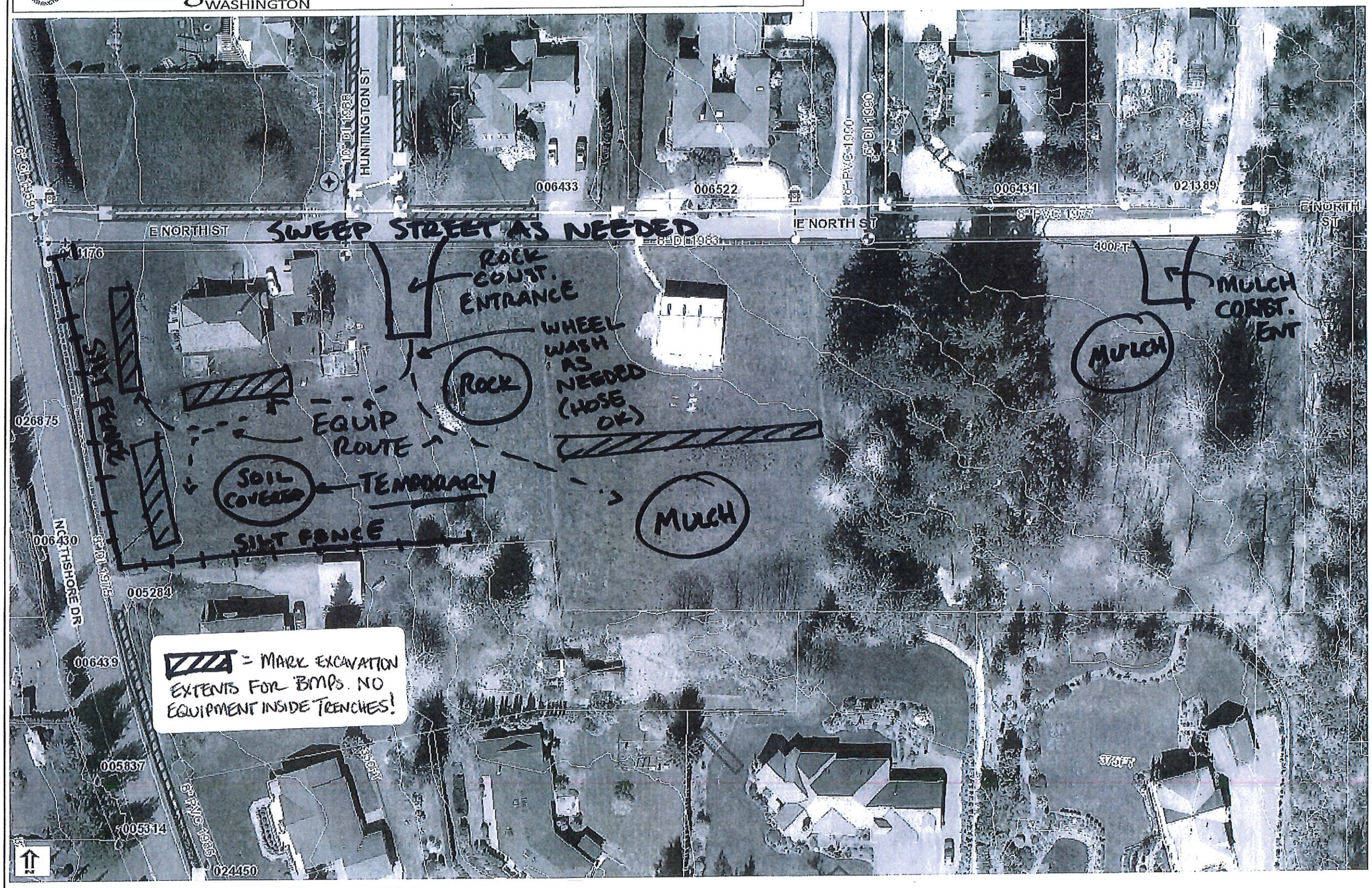
124 0 62 124 Feet

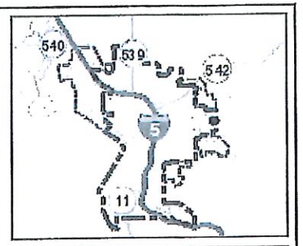
THIS MAP IS NOT TO BE USED FOR NAVIGATION

CASE STUDY / EXAMPLE

City of Bellingham WASHINGTON

HIP Erosion and Sediment Control Plan





Legend

- Catch Basins
- Manhole
- Clean Out
- Pipe End
- Fitting
- Lateral Line
  - Collector
  - Drain Line
  - Storm Service Line
- Culvert
- Storm Main
  - City Mains, Active
  - City Mains, Under Construction
  - Private Mains, Active
  - Private Mains, Under Construction
- Ditch
- Storm Access Points
  - Access Cover
  - Observation Well
- Storm Control Structures
- Storm Other Components
  - COB - Public Works
- Open Channel Streams
- Water Access Points
- Service Valve
  - Fireline Valve
  - Hydrant Valve
- Fitting
- Control Valve
  - Air Release
  - Blow Off
- Customer
  - Water Customer
  - Critical Water Customer
- Hydrants
  - City Hydrants
  - City Filling Station
  - Private Hydrants
- Water System Valve
  - Bypass Valve
  - Inline Valve
  - Tapping Valve
  - Zone Valve
- Network Structure
  - Enclosed Storage Facility
  - Pump Station
  - SamplingStation
  - Storage Basin
  - Treatment Plant
- SamplingStations
- Lateral Line
  - Fireline Service
  - Hydrant Service
  - Water Service Line
- Water Main
  - City Main: Active: Potable

Notes

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124 0 62 124 Feet

THIS MAP IS NOT TO BE USED FOR NAVIGATION

CASE STUDY / EXAMPLE

GENERAL CONSTRUCTION STORMWATER POLLUTION PREVENTION PLAN

PURPOSE

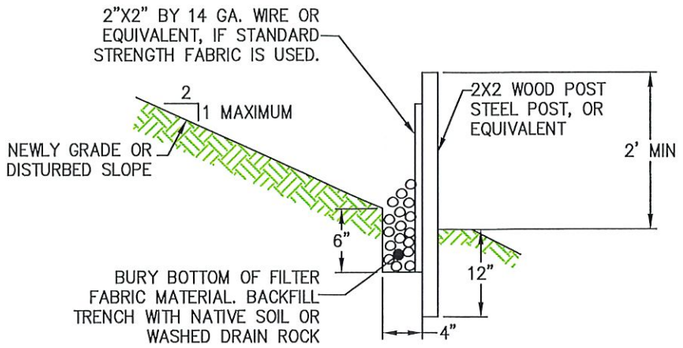
TO PREVENT THE DISCHARGE OF SEDIMENT AND OTHER POLLUTANTS TO THE MAXIMUM EXTENT PRACTICABLE FROM SMALL CONSTRUCTION PROJECTS.

DESIGN AND INSTALLATION

PLAN AND IMPLEMENT PROPER CLEARING AND GRADING OF THE SITE. IT IS MOST IMPORTANT ONLY TO CLEAR THE AREAS NEEDED KEEPING EXPOSED AREAS TO A MINIMUM. PHASE CLEARING SO THAT ONLY THOSE AREAS THAT ARE ACTIVELY BEING WORKED ARE UNCOVERED.

NOTE: CLEARING LIMITS SHALL BE FLAGGED ON THE LOT OR PROJECT AREA PRIOR TO INITIATING CLEARING.

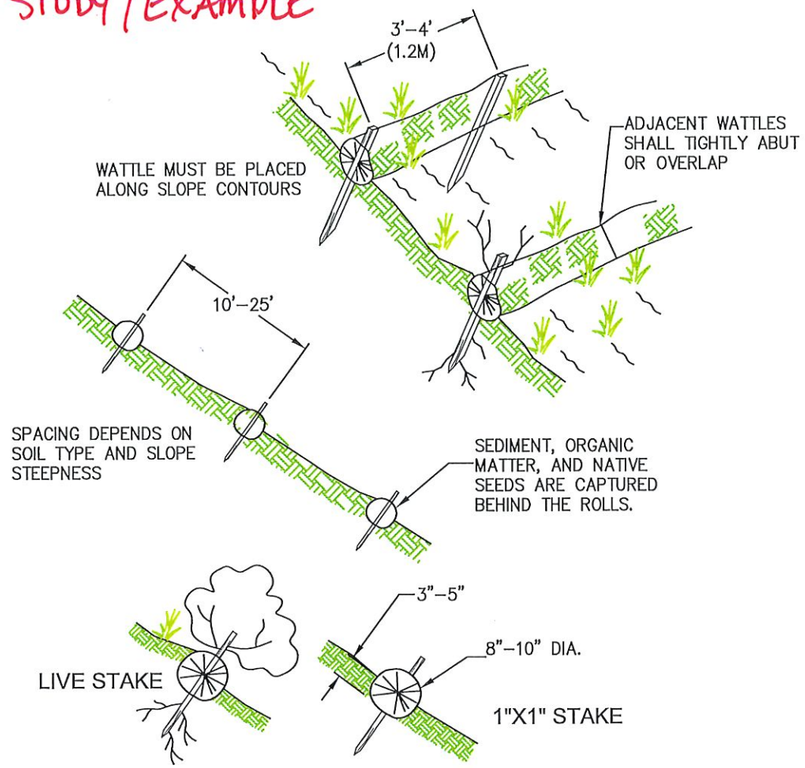
- FROM OCTOBER 1 THROUGH APRIL 30, NO SOILS SHALL REMAIN EXPOSED AND UNWORKED FOR MORE THAN TWO DAYS FROM MAY 1 TO SEPTEMBER 30, NO SOILS SHALL REMAIN EXPOSED AND UNWORKED FOR MORE THAN SEVEN DAYS.
- SOIL SHALL BE MANAGED IN A MANNER THAT DOES NOT PERMANENTLY COMPACT OR DETERIORATE THE FINAL SOIL AND LANDSCAPE SYSTEM. IF DISTURBANCE AND/OR COMPACTION OCCUR THE IMPACT MUST BE CORRECTED AT THE END OF THE CONSTRUCTION ACTIVITY. THIS SHALL INCLUDE RESTORATION OF SOIL DEPTH, SOIL QUALITY, PERMEABILITY, AND PERCENT ORGANIC MATTER. CONSTRUCTION PRACTICES MUST NOT CAUSE DAMAGE TO OR COMPROMISE THE DEPTH OF PERMANENT LANDSCAPE OR INFILTRATION AREAS.
- LOCATE ANY SOIL PILES AWAY FROM DRAINAGE SYSTEMS. SOIL PILES SHOULD BE TARPED OR MULCHED UNTIL THE SOIL IS EITHER USED OR REMOVED. PILES SHOULD BE SITUATED SO THAT RUNOFF DOES NOT RUN INTO THE STREET OR ADJOINING YARDS.
- BACKFILL WALLS AS SOON AS POSSIBLE AFTER BACKFILLING. THIS WILL ELIMINATE ANY SEDIMENT LOSS FROM SURPLUS FILL.
- THE CONSTRUCTION ENTRANCE SHALL BE STABILIZED WHERE TRAFFIC WILL BE LEAVING THE CONSTRUCTION SITE AND TRAVELING ON PAVED ROADS OR OTHER PAVED SURFACES.
- PROVIDE FOR PERIODIC STREET CLEANING TO REMOVE ANY SEDIMENT THAT MAY HAVE BEEN TRACKED OUT. SEDIMENT SHOULD BE REMOVED BY SHOVELING OR SWEEPING AND CAREFULLY REMOVED TO A SUITABLE DISPOSAL AREA WHERE IT WILL NOT BE RE-ERODED, STREET WASHING IS PROHIBITED.



TYPICAL CROSS SECTION

SILT FENCE SEDIMENT BARRIER

NTS

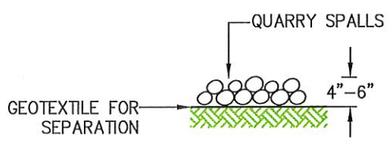


NOTE:

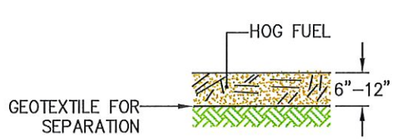
1. WATTLE INSTALLATION REQUIRES THE PLACEMENT AND SECURE STAKING OF THE WATTLE IN A TRENCH, 3"-5" DEEP, DUG ON CONTOUR. RUNOFF MUST NOT BE ALLOWED TO RUN UNDER OR AROUND WATTLE

WATTLES (SEDIMENT BARRIER)

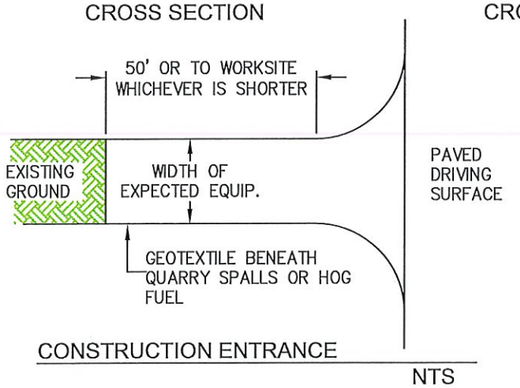
NTS



QUARRY SPALL CROSS SECTION

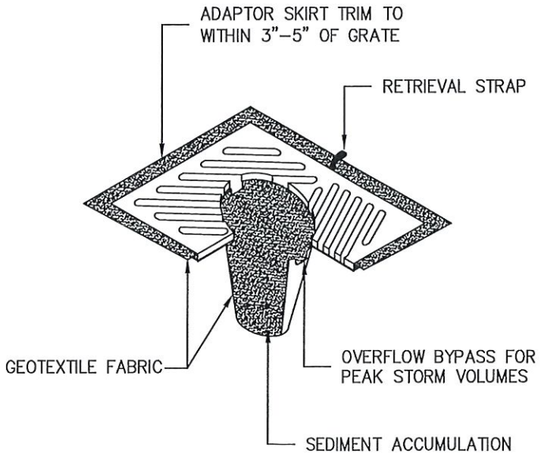


HOG FUEL CROSS SECTION



CONSTRUCTION ENTRANCE

NTS



NOTES:

1. INSERT SHALL BE INSTALLED PRIOR TO CLEARING AND GRADING ACTIVITY, OR UPON PLACEMENT OF A NEW CATCH BASIN.
2. SEDIMENT SHALL BE REMOVED FROM THE UNIT WHEN IT BECOMES HALF FULL.
3. SEDIMENT REMOVAL SHALL BE ACCOMPLISHED BY REMOVING THE INSERT, EMPTYING, AND RE-INSERTING IT INTO THE CATCH BASIN.

CATCH BASIN INSERT (INLET PROTECTION) DETAIL

NTS

CASE STUDY / EXAMPLE

Address: -

HIP Project Planting Plan - Dispersion Area

Owner Name : Example Project for Certification

My HIP Project will meet the required density for the following layers (Choose AND CIRCLE at least two)

Canopy (Native Trees)	Understory (Native Shrubs)	Groundcover (Small Native Plants)

If you chose:		Then your minimum density will be...		
A	Canopy, Understory, and Groundcover	Divide project area by 225 (15' o.c.)	98	Trees
		Divide project area by 64 (8' o.c.)	344	Shrubs
		Divide project area by 25 (5' o.c.)	880	Groundcovers
B	Canopy and Understory Only (No Groundcovers)	Divide project area by 144, (12' o.c.)	153	Trees
		Divide project area by 36 (6' o.c.)	611	Shrubs
C	Canopy and Groundcovers Only (No Understory)	Divide project area by 144 (12' o.c.)	153	Trees
		Divide project area by 16 (4' o.c.)	1375	Groundcovers
D	Understory and Groundcover Only (No Canopy)	Divide project area by 49 (7' o.c.)	449	Shrubs
		Divide project area by 25 (5' o.c.)	880	Groundcovers

Total Project Area (in square feet)
22000

Plant List, Please complete with species name (common or scientific) and desired number

Native Trees	
Species Name	**#**
Alaska Yellow Cedar	10
Beaked Hazlenut	10
Big Leaf Maple	10
Cascara	10
Western Redcedar	10
Western Hemlock	10
Oregon Ash	10
Blue Elderberry	10
Vine Maple	10
Douglas' Maple	8
Total	98

Native Shrubs	
Species Name	**#**
Bald Hip Rose	35
Salal	35
Tall Oregon Grape	35
Osoberry	35
Pacific Rhododendron	35
Red-flowering Currant	35
Shiny Leaf Spirea	35
Salmonberry	35
Thimbleberry	35
Black Cap Raspberry	29
	344

Native Groundcovers	
Species Name	**#**
Kinnikinnick	88
Beach Strawberry	88
~~Coast~~ Forest Strawberry	88
Oxalis	88
Douglas Aster	88
Deer Fern	88
Sword Fern	88
Licorice Fern	88
Inside-out Flower	88
Nodding Onion	88
	880

CASE STUDY / EXAMPLE

Address:

HIP Project Planting Plan - New Landscape

Owner Name : Example Project for Certification

My HIP Project will meet the required density for the following layers (Choose AND CIRCLE at least two)

Canopy (Native Trees) | **Understory (Native Shrubs)** | **Groundcover (Small Native Plants)**

If you chose:		Then your minimum density will be...		
A	Canopy, Understory, and Groundcover	Divide project area by 225 (15' o.c.)	204	Trees
		Divide project area by 64 (8' o.c.)	719	Shrubs
		Divide project area by 25 (5' o.c.)	1840	Groundcovers
B	Canopy and Understory Only (No Groundcovers)	Divide project area by 144, (12' o.c.)	319	Trees
		Divide project area by 36 (6' o.c.)	1278	Shrubs
C	Canopy and Groundcovers Only (No Understory)	Divide project area by 144 (12' o.c.)	319	Trees
		Divide project area by 16 (4' o.c.)	2875	Groundcovers
D	Understory and Groundcover Only (No Canopy)	Divide project area by 49 (7' o.c.)	939	Shrubs
		Divide project area by 25 (5' o.c.)	1840	Groundcovers

Total Project Area (in square feet)
46000

Plant List, Please complete with species name (common or scientific) and desired number

Native Trees	
Species Name	**#**
Alaska Yellow Cedar	10
Beaked Hazlenut	50
Big-Leaf Maple	16
Cascara	25
Western Red Cedar	10
Western Hemlock	10
Oregon Ash	16
Blue Elderberry	25
Vine Maple	25
Douglas Maple	17
	204

Native Shrubs	
Species Name	**#**
Bald Hip Rose	50
Salal	150
Tall Oregon Grape	50
Osoberry	40
Pacific Rhododendron	40
Red-flowering Currant	100
Shiny leaf Spirea	50
Salmonberry	100
Thimbleberry	39
~~Red~~ Black Cap Raspberry	100
	719

Native Groundcovers	
Species Name	**#**
Kinnikinnick	250
Beach Strawberry	250
Forest Strawberry	250
Oxalis	100
Douglas Aster	50
Deer Fern	250
Sword Fern	250
Licorice fern	50
Inside out Flower	195
Nodding Onion	195
	1840

CASE STUDY / EXAMPLE

Address:

HIP Project Planting Plan - Landscape Rehab

Owner Name : Example Project for Certification

My HIP Project will meet the required density for the following layers (Choose AND CIRCLE at least two)

Canopy (Native Trees) | **Understory (Native Shrubs)** | **Groundcover (Small Native Plants)**

If you chose:		Then your minimum density will be...		
(A)	Canopy, Understory, and Groundcover	Divide project area by 225 (15' o.c.)	178	Trees
		Divide project area by 64 (8' o.c.)	625	Shrubs
		Divide project area by 25 (5' o.c.)	1600	Groundcovers
B	Canopy and Understory Only (No Groundcovers)	Divide project area by 144, (12' o.c.)	278	Trees
		Divide project area by 36 (6' o.c.)	1111	Shrubs
C	Canopy and Groundcovers Only (No Understory)	Divide project area by 144 (12' o.c.)	278	Trees
		Divide project area by 16 (4' o.c.)	2500	Groundcovers
D	Understory and Groundcover Only (No Canopy)	Divide project area by 49 (7' o.c.)	816	Shrubs
		Divide project area by 25 (5' o.c.)	1600	Groundcovers

Total Project Area (in square feet)
40000

Plant List, Please complete with species name (common or scientific) and desired number

Native Trees	
Species Name	**#**
Existing Trees	82
Cascara	16
Beaked Hazlenut	16
Vine Maple	16
Blue Elderberry	16
Red Elderberry	16
Big-Leaf Maple	16

178

Native Shrubs	
Species Name	**#**
Existing Shrubs	250
Salal	65
Red-Flowering Currant	65
Pacific Rhododendron	65
Shiny leaf Spirea	65
Salmonberry	65
Black Cap Raspberry	50

625

Native Groundcovers	
Species Name	**#**
Existing Groundcovers	1000
Kinnikinnick	150
Beach Strawberry	150
Forest Strawberry	150
Sword Fern	150
~~Deer Fern~~	~~200~~

1600