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

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

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):

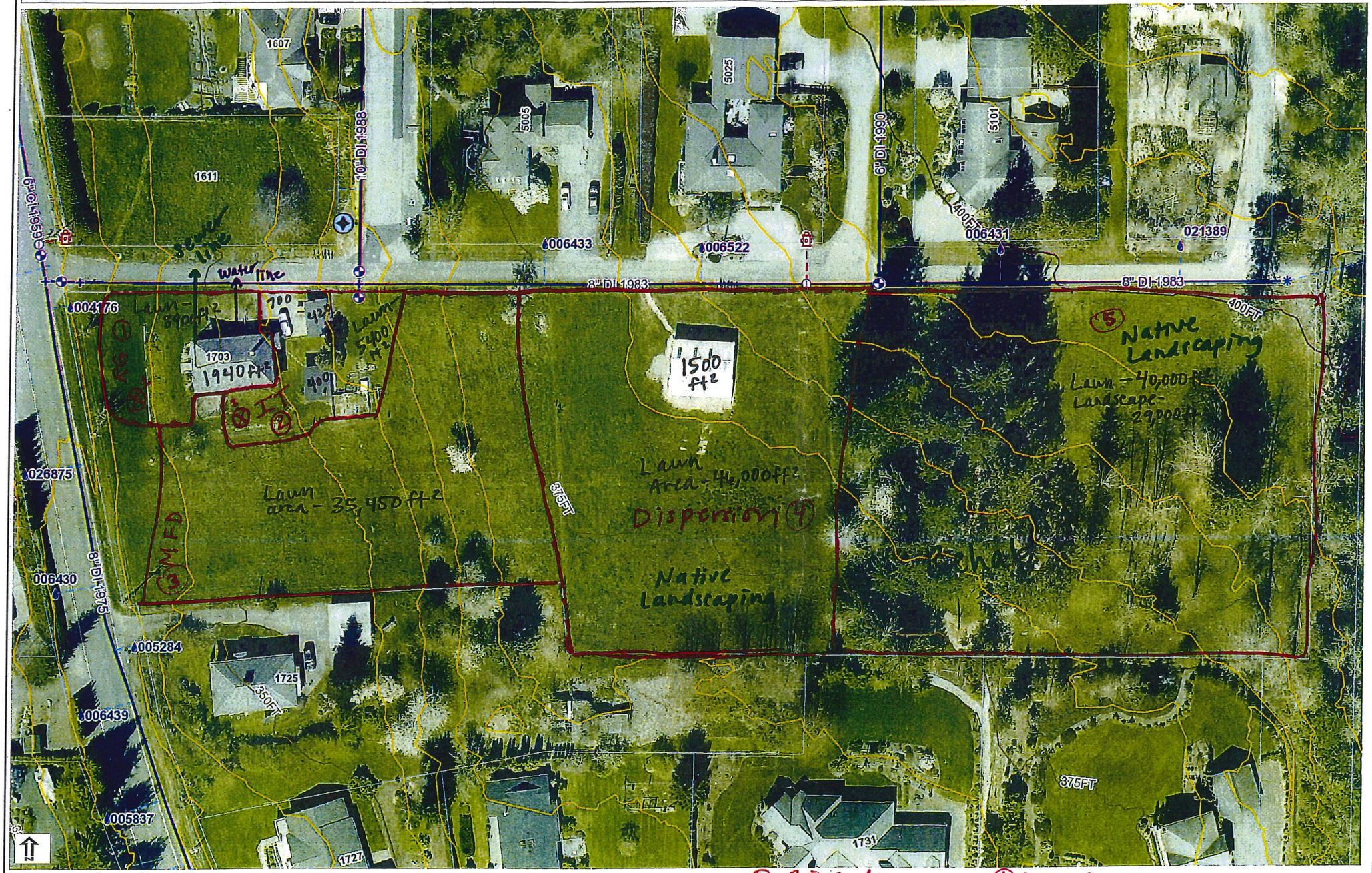
Clay	Clayey Silt
Silt/Loam	Sandy Loam/Sand

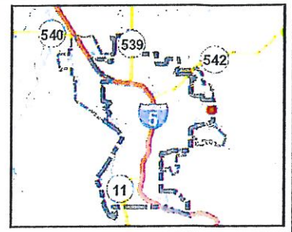
I've characterized my soil as:

☐ Good
☐ Moderate
☐ Marginal
☐ Poor

City of Bellingham WASHINGTON

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





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

Printed: 3/12/2018 12:39:10 PM

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

Property Owner: _____

Site Address: _____

Submittal Requirements Checklist

Use this checklist to determine which submittal documents are required for your project. Please make sure all of the required documents are included in the submittal packet and check the appropriate boxes.

Part I: Submittal requirements for all HIP projects

- ☐ Project Summary & Project Narrative
- ☐ Project Site Plan
  - ☐ Existing Conditions Sheet with utilities, including approximate location of rights-of-way
  - ☐ Proposed Improvements Sheet (BMP footprint, dimensions, and conveyance)
- ☐ Stormwater Pollution Prevention Plan (SWPPP) -required for all ground-disturbing projects
  - ☐ SWPPP Narrative
  - ☐ Erosion and Sediment Control Plan Sheet
  - ☐ Erosion and Sediment Control Details
- ☐ Material Specifications

Part II: Submittal requirements for each primary BMP

- ☐ **Native Landscaping**
  - ☐ Design Submittal (Sections I - II)
  - ☐ Plant Density Calculator
  - ☐ Plant List
- ☐ **Infiltration Trench**
  - ☐ Design Submittal (Sections I - II)
  - OR
    - ☐ Sizing Calculator
    - ☐ Alternative Sizing Calculator
  - ☐ Facility Cross Section
- ☐ **Media Filter Drain**
  - ☐ Design Submittal (Sections I - II)
  - OR
    - ☐ Sizing Calculator
    - ☐ Alternative Sizing Calculator
  - ☐ Facility Cross Section

Part II (continued)

☐ **Dispersion**

- ☐ Design Submittal (Sections I - II)

OR
- ☐ Sizing Calculator
- ☐ Alternative Sizing Calculator

- ☐ Facility Cross Section

☐ **Lake Whatcom Rain Garden**

- ☐ Design Submittal (Sections I - II)

OR
- ☐ Sizing Calculator
- ☐ Alternative Sizing Calculator

- ☐ Facility Cross Section

Part III: Submittal requirements specific to the City or County

City Only:

☐ Stormwater Permit Application*

☐ Other City forms if applicable

**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 standards.*

County Only:

☐ Natural Resource Notification of Activity

☐ Other County forms if applicable

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.

HIP

Project Summary

Address: _____ Parcel #: _____
(street address) *(zip code)*

Owner:	Phone:	Email:
HIP Staff:	Phone:	Email:
Designer:	Phone:	Email:

Short Description:

_____

_____

_____

_____

Check boxes below to characterize the project:

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

Measurement	Number	Notes
Total Treatable Area	ft^2	
Area Landscaped by Project	ft^2	
Area Infiltrated by Project	ft^2	
Area Dispersed/Treated by Project	ft^2	
New or Replaced Lawn	ft^2	
New or Replaced Hard Surface	ft^2	
Amount of Soil Excavated	yd^3	

HIP

Project Narrative

The following project, located at _____ 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: _____

This component will be _____ ft^2 in size.

This component addresses _____ ft^2 of site area.

Location of BMP relative to house: _____

❖ BMP#2: _____

This component will be _____ ft^2 in size.

This component addresses _____ ft^2 of site area.

Location of BMP relative to house: _____

❖ BMP#3: _____

This component will be _____ ft^2 in size.

This component addresses _____ ft^2 of site area.

Location of BMP relative to house: _____

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

Material Specifications

In order to ensure project approval and reimbursement for project expenses, HIP applications must clearly define the materials for each BMP. Designers are strongly encouraged to adhere verbatim to the material definitions found in the most current version of the *HIP 2.0 BMP - Material Specifications* book included as an appendix to this manual and available online at www.LakeWhatcomHIP.org/resources.

Pre-approved permits for HIP projects are based on the assumption that all materials will match those shown in the *HIP Specifications* book. Streamlined application review requires that these specs are followed exactly as published. Alternative specifications, if proposed, must be reviewed for compliance with design guidelines and regulations and may be subject to additional or conditional requirements. HIP cannot guarantee approval of alternative materials. Decisions on allowances for alternatives are made on a case-by-case basis.

Instructions:

Based on the project site plan and facility cross-section details, **check the box next to ALL materials selected for this project that will follow the *HIP 2.0 BMP - Material Specifications* book.** Note and clearly identify proposed alternative specifications, if any, in the space provided or attach additional pages with details and justifications. Materials submitted that do not meet HIP Specifications are not guaranteed for approval and may be subject to additional requirements or regulations.

Material Specifications List

Check Here	Material Name in HIP 2.0 BMP Material Spec Book	Check Here	Material Name in HIP 2.0 BMP Material Spec Book
	Native Plants (Page 15)	**Pipe and Drains (Pages 9-10)**	
Rock Materials (Pages 4-7)			Atrium Grate
	Cascade Stone		Catch Basin
	Media Filter Drain Mix		Fine Mesh Screen
	Pea Gravel		Perforated Pipe
	Permeable Ballast		Pipe Couplings and Fittings
	Quarry Spalls		Rigid Solid Pipe
	River Rock		Solid Lids and Grates
	Sand		Trench Drain
	Shoreline Gravel		Trench Drain Grate
	Washed Drain Rock		Type 1 Catch Basin
		Permeable Pavement Materials (Pages 11-12)	
Mulch and Compost Materials (Pages 7-8)			Permeable Interlocking Paver System
	Compost		Permeable Pavers
	Hog Fuel		Permeable Paver Joint Filler
	Low-Phosphorus Mulch		Poured Permeable Surfacing
Soil-Based Materials (Pages 8-9)			Edge Restraints
	Low-P Rain Garden Soil Mix		Grid Paver System
	Low-P Topsoil		

Material Specifications List Continued			
Check Here	**Material Name in HIP 2.0 BMP Material Spec Book**	**Check Here**	**Material Name in HIP 2.0 BMP Material Spec Book**
Erosion Controls (Pages 12-14)		**Other (Pages 14-15)**	
	Catch Basin Inserts		Dispersion Trench Edging
	Grass Seed		Dispersion Trench Support Post
	Sandbags		Geotextile for Drainage
	Silt Fencing		Rigid, Waterproof Barrier
	Sod		
	Soil Coverage Tarp		
	Wattles		

Include any additional modifications here:

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:

Element 2 – Establish Stabilized Construction Access:

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:

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:

Element 7 – Protect Drain Inlets:

Element 8 – Stabilize Channels and Outlets:

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:

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_____ft² of impervious surface and/or _____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 _____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 _____ native plants in my rain garden.
☐	I have calculated the amount of lake-friendly mulch (area divided by 80) I will need. I have chosen mulch from the HIP-approved mulch list.
	My rain garden plan requires _____ cubic yards of approved mulch.

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.

Sizing Calculator
Lake Whatcom Rain Garden

How to Use Sizing Calculator:
Input project-specific data into the table below to calculate the size of the ponding area of the rain garden facility. 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	[ ] ×	[ ] +	[ ] ×	[ ] =	
Marginal	[ ] ×	[ ] +	[ ] ×	[ ] =	
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

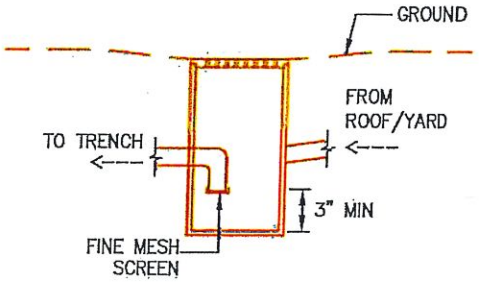
☐ Soil Texture Test

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

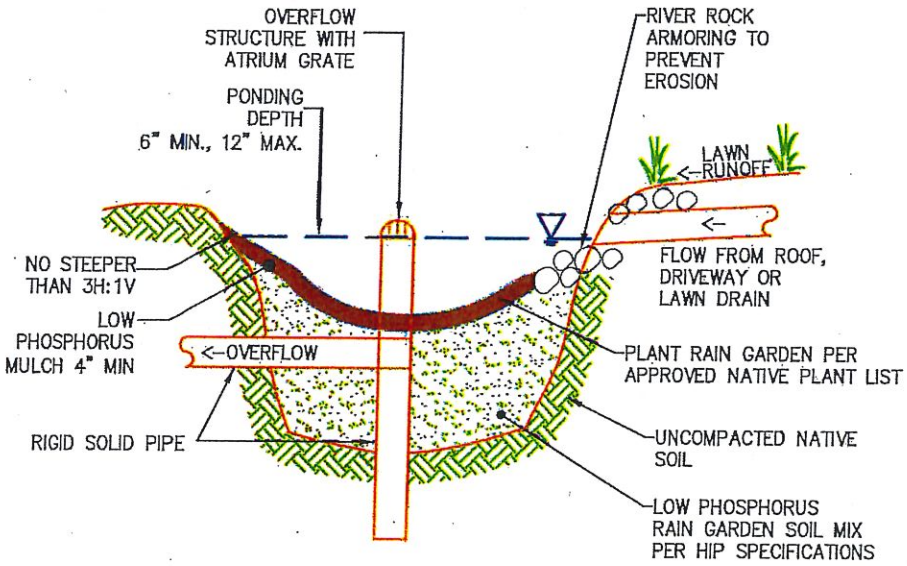
Clay	Clayey Silt
Silt/Loam	Sandy Loam/Sand

I've characterized my soil as:

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



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.

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_____ft² of impervious surface and/or _____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 _____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 _____ 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.
☐	If any portion of my trench is within 10' of a neighboring property, I have received written approval to proceed from that neighboring property owner.
☐	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.

Sizing Calculator
Infiltration Trench

Sizing Calculator: input soil characterization data into the table below to calculate the size of the facility.

Instructions: using the soil type identified on the Soil Characterization Sheet 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	[	0.09]	[	0.04]	
Marginal	[	0.12]	[	0.06]	
Poor	Infiltration Not Recommended. Use Media Filter Drain or Dispersion BMPs.				

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

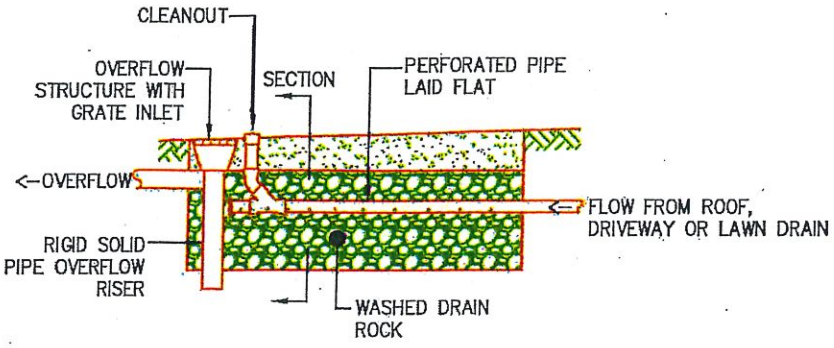
☐ Soil Texture Test

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

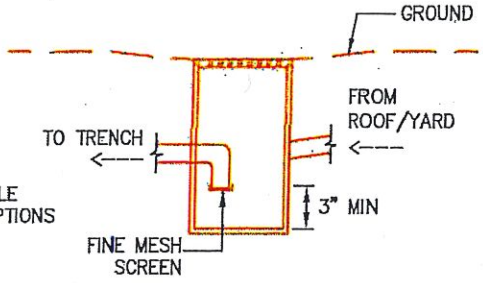
Clay	Clayey Silt
Silt/Loam	Sandy Loam/Sand

I've characterized my soil as:

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



PROFILE VIEW



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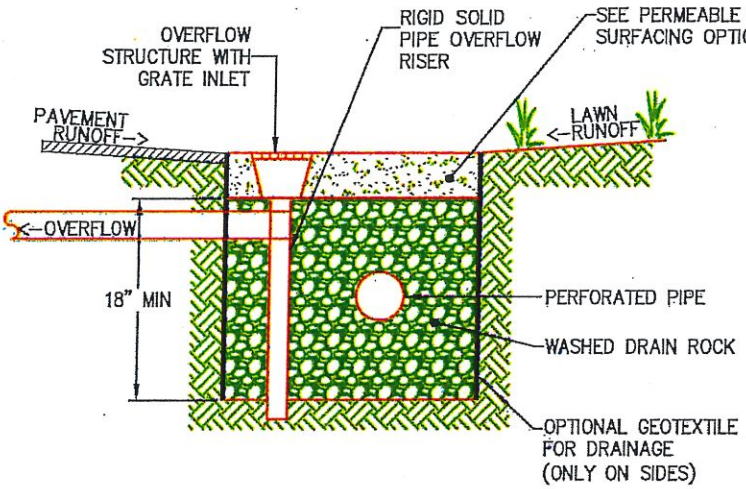


SECTION VIEW

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.

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_____ft² of impervious surface and/or _____ft² of lawn/landscape
☐	I have defined the area that will drain into the MFD by sheet flow.
	That area is_____ft² of impervious surface and/or _____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 _____ feet wide and_____ ft² in filter area

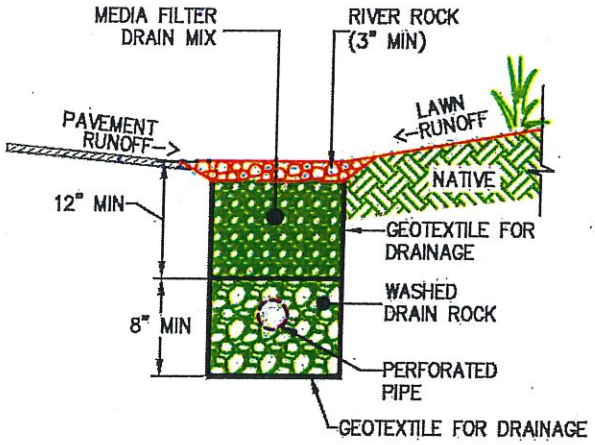
Section II: Site-Specific Planning

☐	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.

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	[	× 0.03] +	[	× 0.01] =	
Piped Flow	[	× 0.04] +	[	× 0.01] =	
Total area of trench needed (add trench areas above):					



SECTION VIEW

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

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_____ft² of impervious surface and/or _____ft² of lawn/landscape
☐	I have defined the area that will drain into the trench by sheet flow
	That area is_____ft² of impervious surface and/or _____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 _____feet long and the downstream vegetated flow path must be at least _____feet in length.

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.

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.

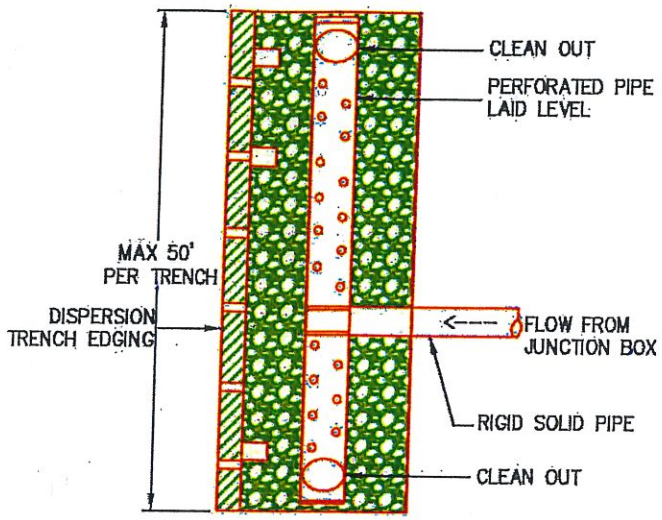
Drainage Type	Impervious Surface (square feet)	Hard Surface Multiplier	Lawn/Landscape (square feet)	Lawn/LS Multiplier	Minimum Trench Length (linear feet)
Sheet Flow	[✖	0.009] ✚	[✖	0.005] 〓	
Piped Flow	[✖	0.014] ✚	[✖	0.005] 〓	
Total length of trench needed (add trench lengths above):					

Step 2: Determine Vegetated 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.

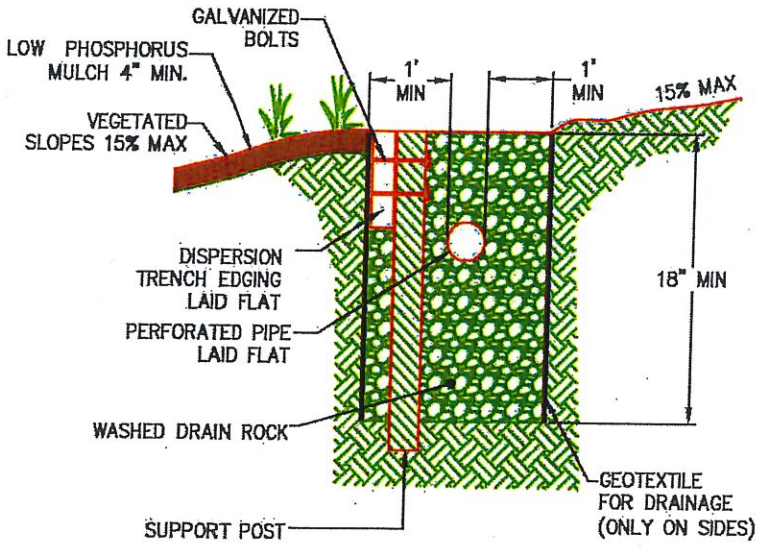
Drainage Type	Hard Surface (square feet) "A"	Lawn/Landscape (square feet) "B"	Lawn Length "C"	Formula	Minimum Flow Path Length* (linear feet)
Sheet Flow	Not part of formula	Not part of formula		((C-25)/3)+25	
Piped Flow			Not part of formula	((A/(B+1))*100)+25	
Total length of vegetated flow path needed* (add flow path lengths above):					

* Note that the total vegetated flow path length will never be less than 25' or more than 100'. If your calculation comes out below or above those numbers, adjust up to 25 or down to 100.

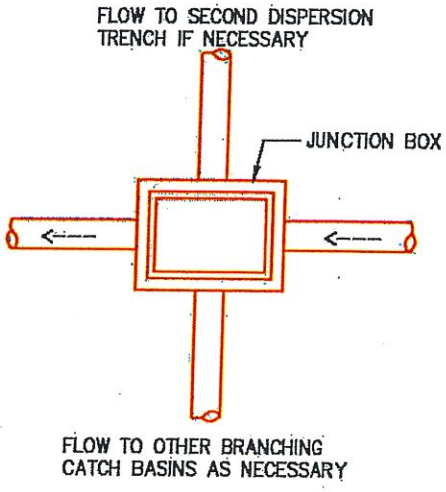
Step 3: If there is no existing established vegetated flow path on-site to disperse to and a vegetated flow path needs to be created, please use the Native Landscaping BMP and accompanying calculator and submittal page in addition to this Dispersion BMP.

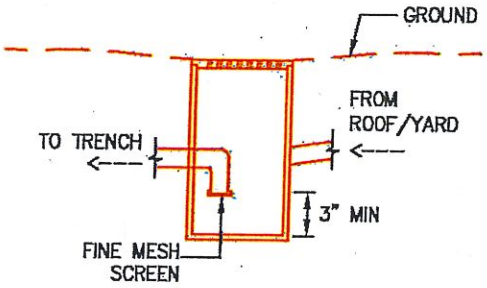


PLAN VIEW



SECTION VIEW





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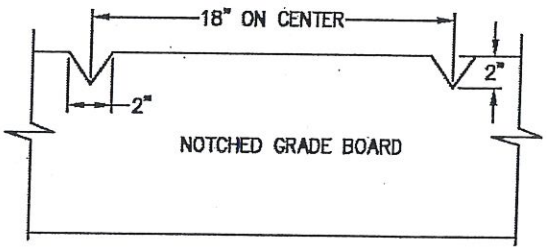


DISPERSION TRENCH EDGING

DISPERSION TRENCH
HIP BMP "D" TYPICAL

NTS

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.
	Native landscaping will replace _____ ft² of lawn/existing landscape and/or _____ ft² of impervious surface
☐	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 _____ ft²
☐	I have selected a vegetation layer combination for each unique planting area (e.g., right-of-way area, front yard, back yard, etc...) and used the HIP plant density calculator to calculate the number of plants and yards of mulch required for each planting area.
	The total combined quantities for all of my planting areas are: _____ cubic yards of approved mulch, _____ trees, _____ shrubs, and _____ 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.

Plant Density Calculator
Native Landscaping

Instructions: Select one of the options listed below for each unique planting area and calculate the minimum required planting density and mulch. Note that existing plants may be counted to meet required plant density numbers.

Option	Vegetation Layer Combination	Plant Layer	Project area (sq ft)	Density Divider	Number of Plants
A	Tree, Shrub, and Groundcover	Trees		225 (15' o.c.*)	
		Shrubs		64 (8' o.c.)	
		Groundcovers		25 (5' o.c.)	
B	Tree and Shrub Only (No Groundcovers)	Trees		144 (12' o.c.)	
		Shrubs		36 (6' o.c.)	
C	Tree and Groundcover Only (No Shrub)	Trees		144 (12' o.c.)	
		Groundcovers		16 (4' o.c.)	
D	Shrub and Groundcover Only (No Tree)	Shrubs		49 (7' o.c.)	
		Groundcovers		25 (5' o.c.)	
Cubic Yards of Mulch				80	

*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.

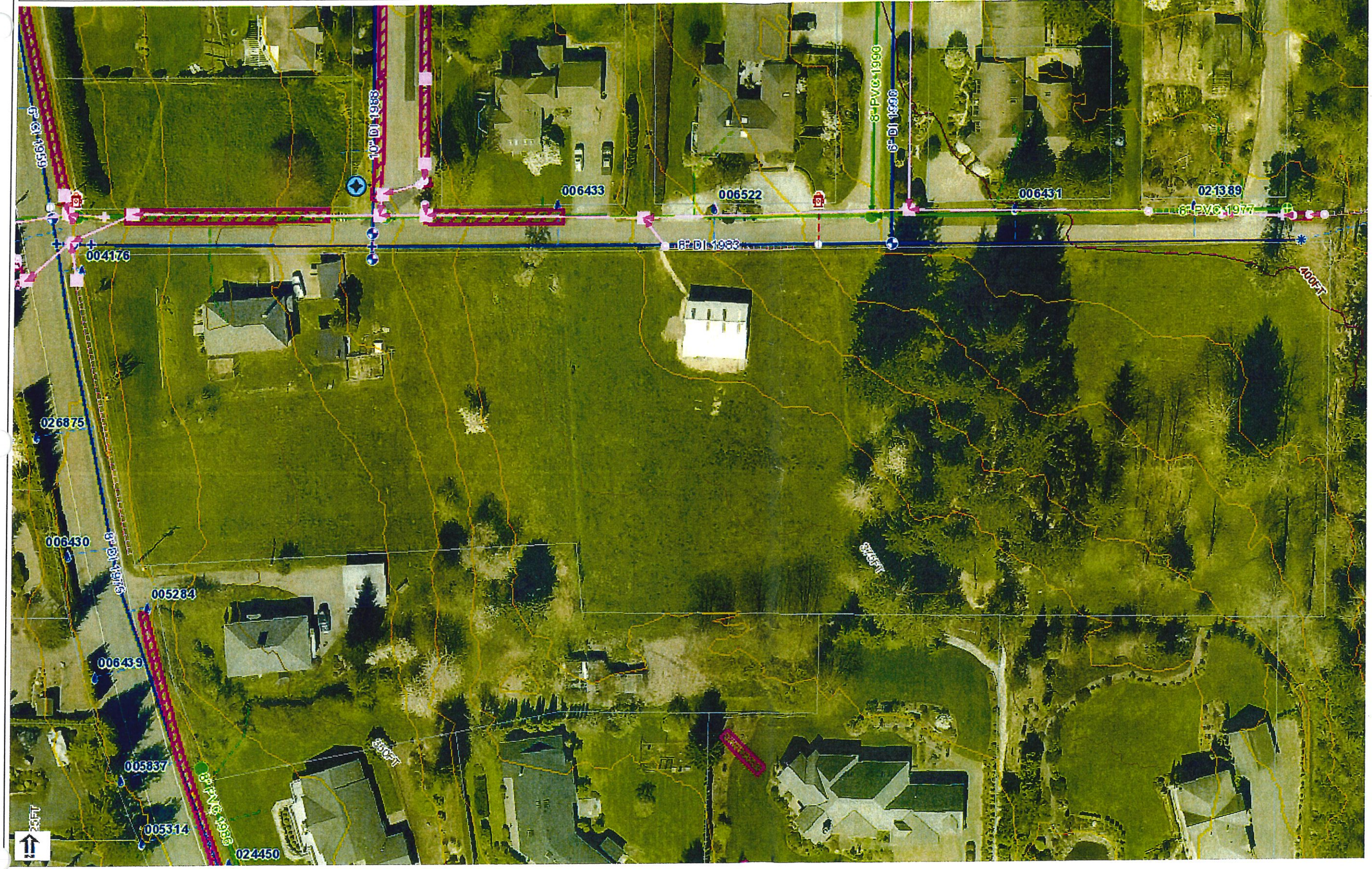
Plant List

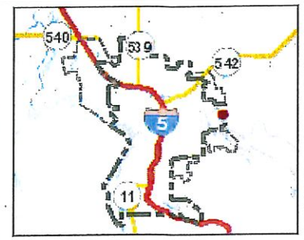
Instructions: submit a list of native plants proposed for the project categorized by tree, shrub, and groundcover. List plant name (scientific preferred) and quantity. Include number of existing plants used to meet plant density requirements. Identify non-natives and cultivars and limit to no more than 10% of total plants.

City of Bellingham WASHINGTON

CityIQ Map

EXISTING CONDITIONS





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
- 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

Notes

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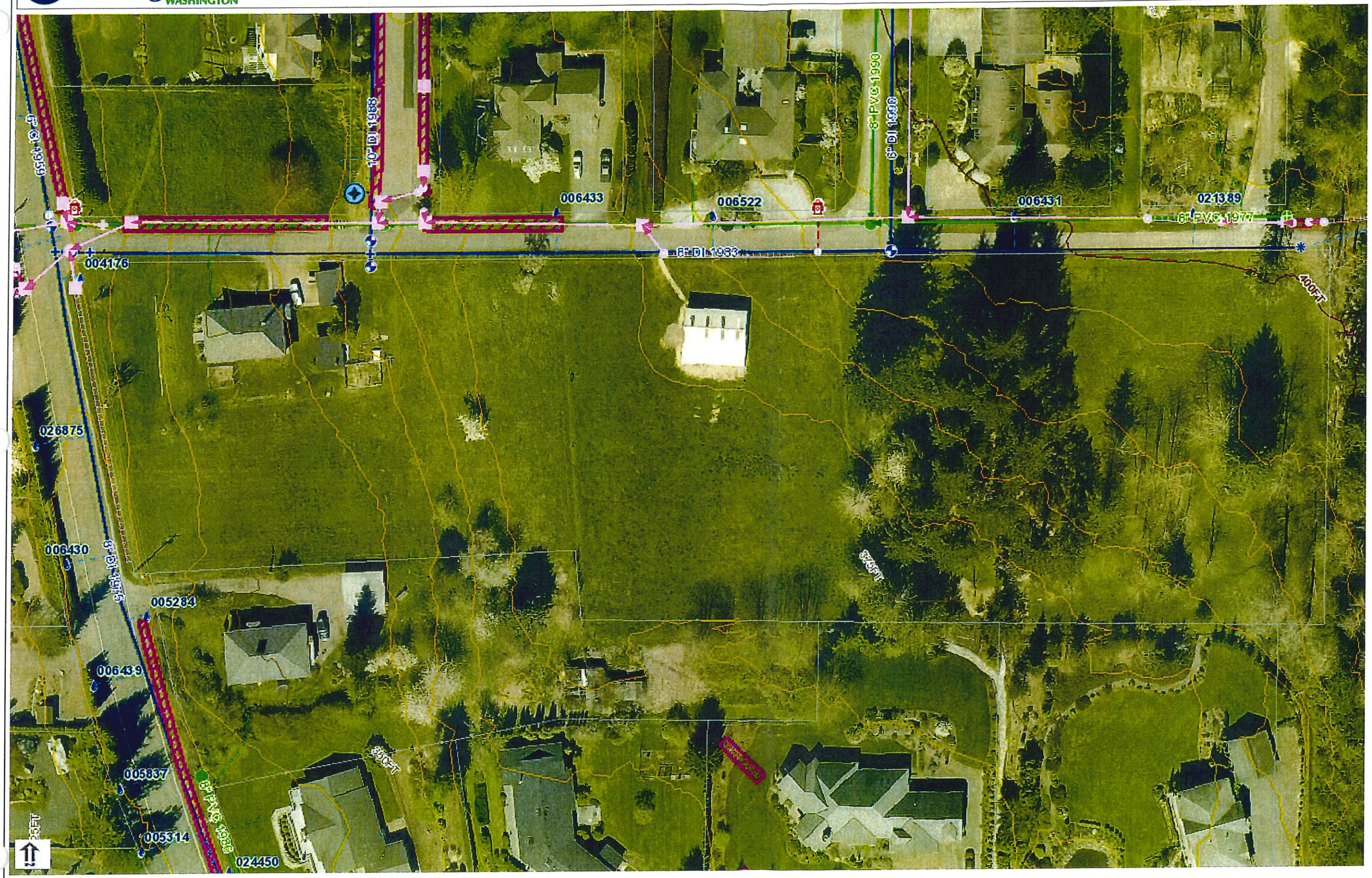
124 0 62 124 Feet

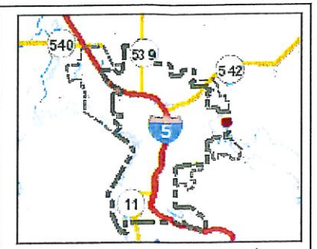
THIS MAP IS NOT TO BE USED FOR NAVIGATION

City of Bellingham WASHINGTON

CityIQ Map

PROPOSED IMPROVEMENTS





Legend

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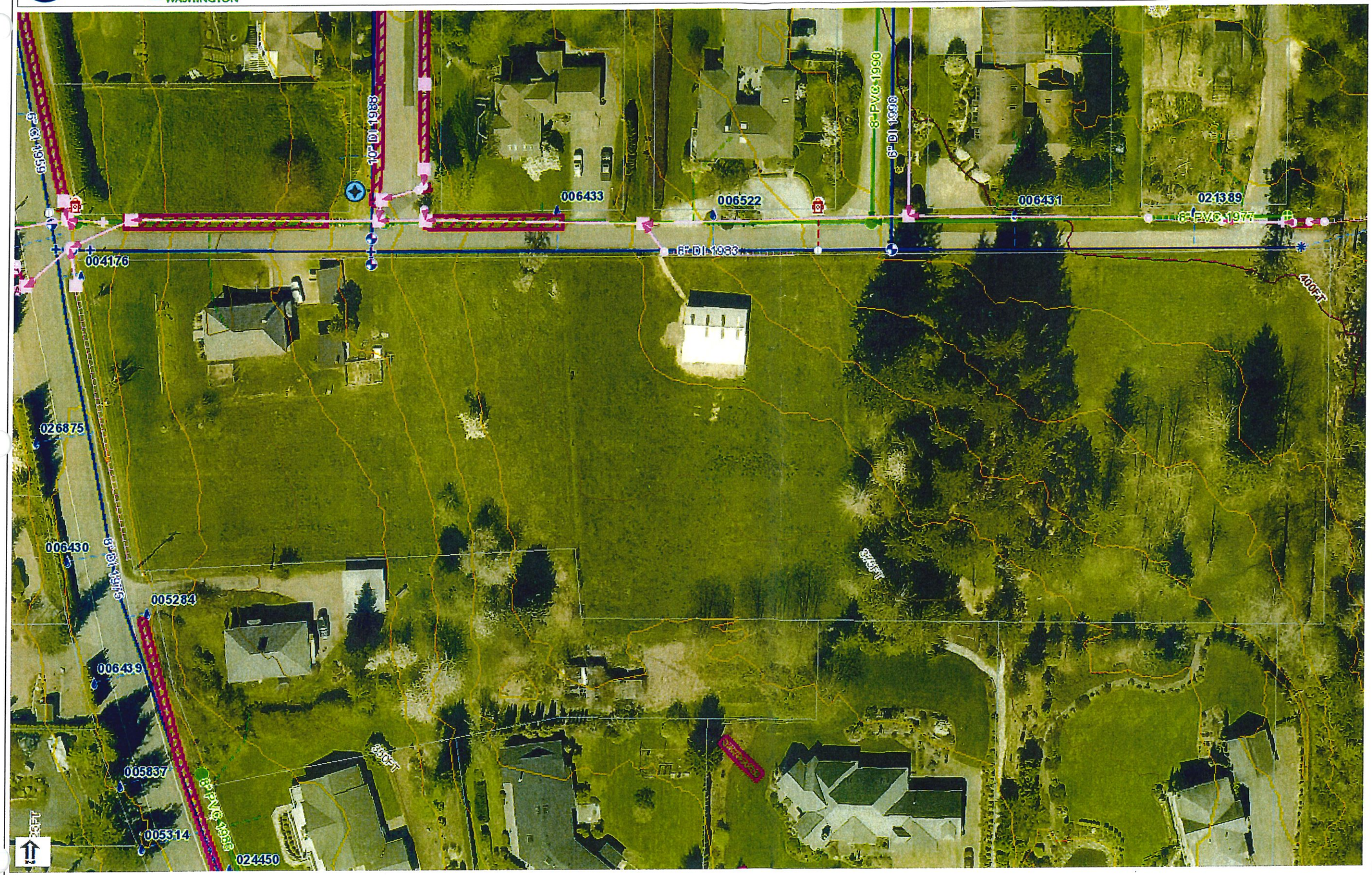
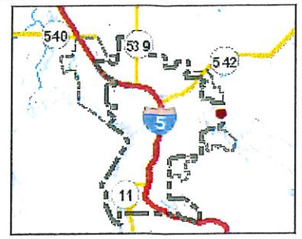
City of Bellingham WASHINGTON

CityIQ Map

EROSION AND SEDIMENT CONTROL PLAN





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Notes

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124 0 62 124 Feet

THIS MAP IS NOT TO BE USED FOR NAVIGATION

Design Guidance

Erosion and Sediment Control

GENERAL CONSTRUCTION STORMWATER POLLUTION PREVENTION PLAN

PURPOSE

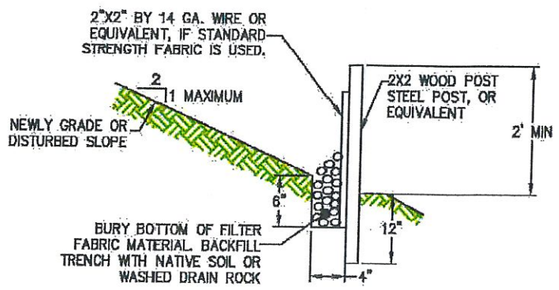
TO PREVENT THE DISCHARGE OF SEDIMENT AND OTHER POLLUTANTS TO THE MAXIMUM EXTENT PRACTICABLE FROM SMALL CONSTRUCTION PROJECTS.

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.

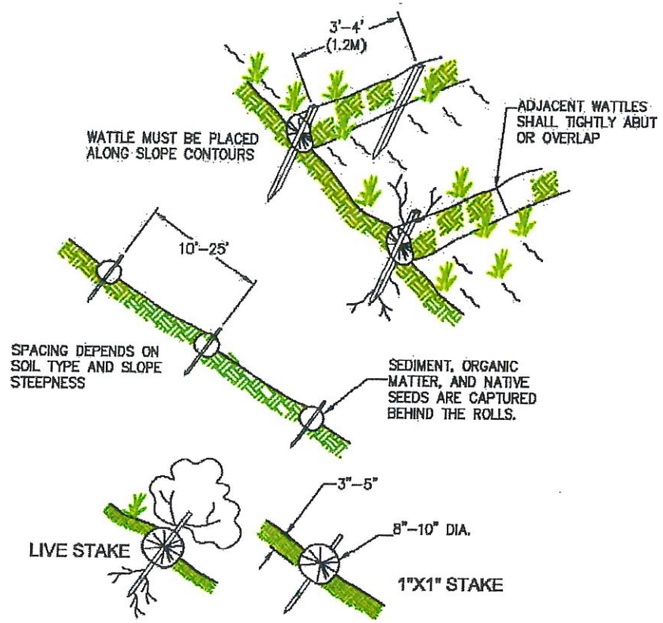
- FROM OCTOBER 1 THROUGH ~~APRIL 30~~ May 31, NO SOILS SHALL REMAIN EXPOSED ~~AND UNWORKED FOR MORE THAN SEVEN DAYS~~ FROM ~~MAY 1~~ June 1 TO SEPTEMBER 30, NO SOILS SHALL REMAIN EXPOSED AND UNWORKED FOR MORE THAN SEVEN DAYS.
- SOIL SHALL BE MANAGED IN A MANNER THAT DOES NOT PERMANENTLY COMPACT OR DETERIORATE 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

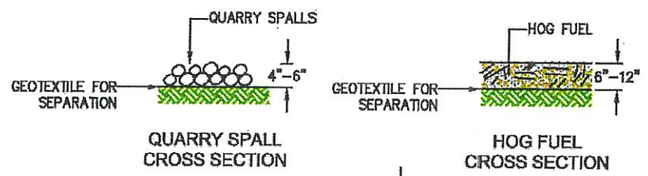


NOTE:

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

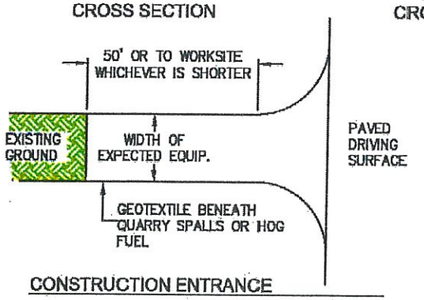
WATTLES (SEDIMENT BARRIER)

NTS



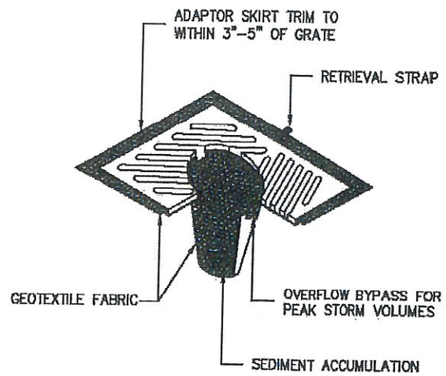
QUARRY SPALL CROSS SECTION

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