



201906240189

06/24/2019 04:22 PM Pages: 1 of 88 Fees: \$166.00  
Skagit County Auditor

FILED FOR RECORD AT THE  
REQUEST OF/RETURN TO:  
Granite Holdings, LLC  
901 Metcalf Street  
PMB 34  
Sedro Woolley, WA. 98284

SKAGIT COUNTY WASHINGTON  
REAL ESTATE EXCISE TAX

JUN 24 2019

Amount Paid \$ \_\_\_\_\_  
Skagit Co. Treasurer  
By *BT* Deputy

**DECLARATION OF COVENANTS, CONDITIONS, EASEMENTS AND RESTRICTIONS**

Grantor (s) GRANITE HOLDINGS, L.L.C., a Washington limited liability company  
Grantee (s) THE PUBLIC  
Additional Grantor(s) on page(s)  
Additional Grantee(s) on page(s)  
Abbreviated Legal:  
Additional Legal on page(s) SEE APPENDIX A  
Assessor's Tax Parcel Nos.:

**DECLARATION OF COVENANTS, CONDITIONS, EASEMENTS AND RESTRICTIONS FOR ARBOR GLEN**

This instrument is made on the date hereinafter set forth by the undersigned, who is the owner of certain land situated in the State of Washington, City of Sedro Woolley, County of Skagit, known as ARBOR GLEN, described in Appendix "A" attached hereto. The undersigned agrees and declares that all of said lands are, and will be, held, sold and conveyed subject to and burdened by the following easements, restrictions, covenants and conditions, all of which are for the purpose of enhancing and protecting the value, desirability and attractiveness of said lands. This instrument shall be binding upon all parties having or acquiring any right, title or interest in the said lands or any part thereof, and shall inure to the benefit of the owner thereof and shall otherwise in all respects be regarded as covenants running with the land.

**1. ARTICLE 1 - DEFINITIONS**

1.1. In this declaration, unless the context requires otherwise, the following definition will apply.

1.2. "Association" shall mean the Arbor Glen Owners' Association, a Washington non-profit corporation.

Declaration of Covenants, Conditions and Restrictions  
Arbor Glen  
Page - 1 -

1.3. "Development or Subdivision" shall mean the real property identified in Appendix "A" which is attached hereto and incorporated by this reference.

1.4. "Lot" shall mean and refer to any plot of land intended for sale by Declarant to the public as indicated on the recorded plat or subdivision map of the development with the exception of public and private roadways.

1.5. "Owner" and "Lot Owner" shall mean and refer to the record owner, whether one or more persons or entities of a fee or undivided fee interest in any Lot which is a part of the properties, including contract purchasers, but shall not include a contract seller, a mortgagee or beneficiary under a Deed of Trust, or those holding record ownership merely as security for the performance of an obligation.

1.6. "Declarant" shall mean and refer to GRANITE HOLDINGS, L.L.C., a Washington limited liability company, its successors and/or assigns if such successors or assigns should acquire more than one (1) undeveloped Lot from the Declarant for the purpose of development and Declarant expressly conveys Declarant's rights under this Declaration to such successor and/or assign.

1.7. "Mortgage" means a mortgage, deed of trust, or a real estate contract covering a Lot or other portion of the property.

1.8. "Declaration" means this declaration of covenants, conditions, easements and restrictions applicable to the property recorded in the office of the Skagit County Auditor.

1.9. "Storm Water Infrastructure" means all common storm drains, common roof drains, detention pond, bioretention cells, storm filters, and all other related equipment, infrastructure and improvements, except any such items which are dedicated to, owned by or maintained by the City of Sedro Woolley. That portion of the Storm Water Infrastructure that will be dedicated to and maintained by the City of Sedro Woolley does not include the storm water filter unit, but will include all Storm Water Infrastructure located in and between the curb lines of Stacey Place.

1.10. "Common areas" means all portions of the Development other than Lots 1-19. Such areas may be denoted as "Tracts" on the Plat of Arbor Glen and include areas of land, along with specific facilities and improvements. To the extent that some common areas may be depicted within the boundaries of any Lot within the Development, such common areas consist of easements burdening such Lot for the benefit of the Association and Owners of Lots.

1.11. "Maintenance" means any care, inspection, maintenance, operation, repair, repainting, remodeling, restoration, improvement, renovation, alteration, replacement or reconstruction that is required in order to maintain property in a decent, safe and sanitary condition, in keeping

Declaration of Covenants, Conditions and Restrictions

Arbor Glen

Page - 2 -

with the standards of the Development and with all applicable legal, administrative or regulatory requirements.

## 2. ARTICLE 2 - RESIDENTIAL COVENANTS

The following covenants in this Article 2, are hereby imposed upon the use and ownership of Lots 1-18 in Arbor Glen. Lot 19 is specifically exempt from this Article 2.

2.1. Residential Use. No Lot, except for Lot 19, shall be used except for residential purposes. One accessory building may be erected for purposes such as a private swimming pool, or a shelter or port for the protection of such swimming pool, storage of a boat and/or camping trailer kept for the personal use or for workshop, storage or other such use. However, accessory buildings are only allowed on the conditions that the location of such structure is in conformity with the applicable governmental regulations, is compatible in design and decoration with the residence constructed on such Lot (specifically utilizing siding and construction of same color, materials and design as the residence located on the Lot), does not exceed a footprint square footage greater than 50% of the footprint square footage of the residence located on the Lot and does not unreasonably obstruct or obscure the view of another owner. Property owners shall provide off street parking for their vehicles. Accessory buildings may only be erected after or simultaneous with completion of a residence upon the Lot. No mobile homes or prefabricated modular homes of any kind may be located upon any Lot.

The provisions of this section shall not be deemed to prohibit the right of anyone to construct a residence on any Lot, to store construction materials and equipment on said Lots in the normal course of construction and to use any single family structure as a sales office or model home for the purpose of sales of residences in Arbor Glen.

2.2. Easements. Easements for installation and maintenance of utilities, drainage, and ingress and egress, are reserved as shown on the recorded plat and in any other documents recorded after the date of the recorded plat. Within these easements no structure, planting or other materials shall be placed or permitted to remain which may damage or interfere with the installation and/or maintenance of such utilities, drainage, and ingress and egress, or which may change the direction of flow of water through a drainage channel in the easements, or which may obstruct or retard the flow of water through drainage channels in the easements. The easement area on any Lot and all improvements in it shall be maintained continuously by the Lot owner.

2.3. Temporary Structures. No temporary structure, trailer, basement, tent, shack, garage, barn or other outbuilding on any Lot shall be used as a residence, either temporarily or permanently, at any time other than during construction of a residence on the Lot. During construction of a residence, Owners may reside in a trailer or recreational vehicle located on the Lot. In no event shall such temporary living arrangements be utilized for a period of longer than 1 year.

2.4. Fences and Hedges. No fence shall exceed six (6) feet in height from the finished Lot grade. Side yard fences shall not project beyond the front walls of any dwelling or garage. No chain link fencing may be used. Hedges or other solid screen planting may be used as Lot line barriers subject to the same height restrictions as fences.

2.5. Propane Tanks. All liquid propane tanks or other such item shall be shielded from view by burial or by a wood fence, enclosure of similar siding, color and design as the residence or greenscreen of adequate height and density so that no part of the propane tank or other such item is visible to any other owner or from any public road or location.

2.6. Offensive Activity. No noxious or offensive activity shall be carried on upon any Lot, nor shall anything be done thereon which may be, or may become, through noise, dust, emission, sight or smell, an annoyance or a nuisance in Arbor Glen.

2.7. Business and Commercial Uses. No trades, crafts, business, professions, commercial or similar activity of any kind shall be conducted in Arbor Glen, except for Lot 19.

2.8. Signs. No sign of any kind shall be displayed to the public view on any Lot or improvement, except one professionally made sign of not more than six square feet advertising the property for sale. This restriction shall not prohibit the temporary placement of political signs on any Lot by the owner, or placement of a sign by the Declarant, which signs must comply with the local sign ordinances. This restriction shall not apply to signs used by the Declarant, builders, realtors or agents during the original construction and sales of the Lots and/or residences.

2.9. Parking. No more than one boat, trailer, motorcycle, truck, truck-camper and like equipment may be parked or stored on any part of any Lot or on public ways adjacent thereto except within the confines of an enclosed garage, storage port, or behind a screening fence or shrubbery which shall in no event project beyond the front walls of any dwelling or garage. No owner shall permit any vehicle which is in a state of disrepair to be abandoned or to remain parked upon any Lot for more than forty-eight (48) hours. No parking shall be allowed on the street, Stacey Place.

2.10. Animals. No animals, livestock or poultry of any kind shall be raised, bred or kept on any Lot in a manner which creates a nuisance or unreasonable disturbance to the other owners. No animals, livestock or poultry may be kept, bred or maintained for any commercial purposes. No Lot owner shall cause, permit or allow any dog owned by or in his custody to roam, run, or be away from the premises of such owner or custodian.

2.11. Trash or Rubbish. No Lot shall be used or maintained as a dumping ground for trash or rubbish. Trash, garbage or other waste shall be kept in sanitary containers and out of public view. All containers for the storage or disposal of such materials shall be kept in a clean and

sanitary condition.

2.12. Construction Completion. Construction of any residence shall be completed, including exterior decoration, within twelve (12) months from the date of the start of such construction. All Lots shall be kept in a neat and orderly condition and free of brush, vines, weeds, and debris.

2.13. Landscape Completion. All front yard landscaping must be completed within one year of the time that the construction of the residence is complete. A residence shall be deemed complete when occupancy of the residence commences or when an occupancy permit is issued by a governmental entity, whichever is earlier.

2.14. Antennae and Service Facilities. Exterior antennae shall not be permitted to be placed upon any Lot or on the roof of any structure. This shall include but not be limited to dish antennae or satellite receivers exceeding three (3) feet in diameter. Each Lot may have a single dish antennae or satellite receiver not exceeding three (3) feet in diameter.

2.15. Exterior Finish. The exterior of each residence shall be designed, built and maintained in such a manner as to blend in with the natural surroundings, existing structures and landscaping of Arbor Glen. Exterior trim, fences, doors, railings, decks, eaves, gutters and the exterior finish of garages and other accessory buildings shall be designed, built and maintained to be compatible with the exterior of the structures they adjoin. No exterior siding material such as T-1-11 will be allowed, except on the back of a structure. For the purposes of the previous sentence, "back" shall be defined as that part of the residence which cannot be seen from the Stacey Place. Roofing must be 25 year asphalt laminated, shingle roof or better.

2.16. Driveway. Driveways for all residences shall be constructed of concrete, exposed aggregate or asphalt and shall be constructed so that they extend outward from the Lot a sufficient distance to join the paved portion of the access road for Arbor Glen. All driveways shall be maintained to present an attractive appearance and to reasonably minimize dust.

2.17. Window Covering. Standard curtain materials or blinds only will be permitted as window covering. At no time are blankets, sheets, tar paper, foil, etc., to be placed in windows.

2.18. Clothes Lines, Other Structures. No clotheslines or other structure of a similar nature not specifically addressed by these covenants shall be visible from Stacey Place.

### 3. ARTICLE 3- ENFORCEMENT

3.1. The Association. Declarant and owners shall have full power and authority to enforce the covenants in this declaration in any proceedings at law or in equity against the person or persons violating or attempting to violate said covenants, and to recover damages sustained by reason of such violation. If the Association, Declarant or any Lot owner employs counsel to enforce any of these covenants, all expenses incurred in such legal process, including a

reasonable attorney's fee shall be paid by the Lot owner found to be violating the covenants.

3.2. City of Sedro Woolley. The City of Sedro Woolley shall have full power and authority to enforce the covenants in this declaration which relate to storm water infrastructure and common areas, in any proceedings at law or in equity against the person or persons violating or attempting to violate said covenants, and to recover damages sustained by reason of such violation. If the City of Sedro Woolley employs counsel to enforce these covenants, all expenses incurred in such legal process, including a reasonable attorney's fee shall be paid by the Lot owner found to be violating the covenants. The City of Sedro Woolley shall also have the authority to enforce these covenants with respect to the imposition of assessments for operation, maintenance and repair of the storm water infrastructure and common areas.

3.3. Effect of Breach on Mortgage. The breach of any of these covenants, conditions or restrictions shall not defeat or render invalid the lien of any mortgage or deed of trust made in good faith for value affecting any Lot or Lots or portions of Lots in Arbor Glen.

3.4. Waiver. No delay or omission of any kind on the part of the Association, Declarant or the owners of other Lots in Arbor Glen in exercising any rights, authority or remedy provided herein, shall be construed as a waiver of the covenants in this declaration. No right of action shall accrue against the Association, Declarant or the owners of Lots in Arbor Glen for or on account of their failure to bring any action to enforce these covenants.

3.5. Extent of Remedies. These covenants are cumulative, and all remedies provided herein for breach are in addition to any other legal or equitable remedies which may be available.

## 5. ARTICLE 5- ASSOCIATION

5.1. Property Owners Association - Purpose. Declarant has established a Washington non-profit corporation, organized under RCW 24.03 (referred to herein as the "Association") for purposes of owning, operating, maintaining and replacing the storm water infrastructure within the Plat of Arbor Glen and other common areas and improvements located in Arbor Glen and enforcing this Declaration.

5.2. Maintenance Standards. All necessary maintenance and repair of the storm water infrastructure shall be conducted by the Association in accordance with the provisions of the Operations and Maintenance Plan which is recorded under Skagit County Auditor's File No. WITH THESE CCRS, and otherwise in accordance with the DOE Stormwater Management Manual for Western Washington ["DOE Stormwater Manual"], as updated from time. Such maintenance requirements currently appear in Volume V, Section 4.6 of the DOE Stormwater Manual. The Association shall consistently engage the services of qualified personnel to perform maintenance of the storm water infrastructure. The City of Sedro-Woolley shall have the right but not the obligation to perform work that is necessary to maintain the storm water infrastructure but that has not been performed by the Association, and to recover any and all

costs so incurred by the City from the Owners of Lots 1-18, inclusive.

5.3. Obligations of Association. The Association shall be responsible for maintenance and repair of all open space consisting of Tracts 994, 995, 996, 997, 998, and 999, any portion of Stacey Place or other common roadways not dedicated to the City of Sedro Woolley, storm water infrastructure, common sidewalks, curbs and gutters and any and all other common equipment, utilities, roadways and improvements.

5.4. Creation of Lien; Personal Obligation. The Declarant and each subsequent owner of any Lot within the described subject property, by virtue of this declaration or a subsequent acceptance of a deed therefor, whether or not it shall be expressed in such deed, covenants and agrees to participate in the payment of costs related to the purpose of the Association, as such purpose is identified in Section 5.1 above, by means of annual or special assessments as may be established by the Association. All such assessments, including any interest, costs and reasonable attorney's fees actually incurred, shall be a charge upon the land and shall be a continuing lien upon the subject Lot against which each assessment is made. Additionally, each assessment, together with interest, costs and reasonable attorney's fees actually incurred, shall be a personal obligation of the person who was the owner of such Lot at the time the assessment fell due. The Declarant shall not be liable for any annual or special assessments for any Lots owned by the Declarant.

5.5. Special Assessments. In addition to any assessments authorized herein, the Association may levy a special assessment in any year. Special assessments shall be determined by a majority of the Board of Directors of the Association at a regular or special meeting convened for such purpose.

5.6. Lien for Assessments. All sums expressed as against any Lot pursuant to this declaration, together with interest, costs and reasonable attorney's fees actually incurred, as provided herein, shall be a secured lien on such Lot in favor of the Association. Such lien shall be superior to all other liens and encumbrances on such Lot, except for liens of ad valorem taxes and except for any liens which are entitled to priority by operation of law. All liens and encumbrances attaching to the subject Lot after this declaration has been recorded shall be inferior to the lien for assessments.

5.7. Effect of Non-Payment; Remedies. Any assessments which are not paid when due shall become delinquent. If the assessment is not paid within thirty (30) days, a late charge of \$25 may be assessed and a lien as herein provided may be recorded and, in addition, the amount due shall include all costs of collection, reasonable attorney's fees, all other amounts permitted by law and interest at the lesser of: (i) twelve percent (12%); or (ii) the maximum legal rate on the amount due. In the event the assessment remains unpaid after sixty (60) days, the Board of Directors of the Association may institute suit to collect such amounts or to foreclose its lien. All owners, by acceptance of a deed or as a party to any type of a conveyance, vests in the Board of Directors of the Association, or its agents, the right and power to bring all actions against him/her/it personally for the collection of such charges as a debt and to foreclose the aforesaid lien in the same manner

as any other liens for the improvement of real property. All payments shall be applied first to costs and attorney's fees, then to interest, then to delinquent assessments.

5.8. Declarant Control Period. The Declarant reserves the right to designate a majority of the members of the Board of Directors of the Association, and to appoint or remove any Officer or Director of the Association or any member of any Committee, or to veto or disapprove any proposed action of the Association, for a period of time not to exceed seven (7) years from the date of this Declaration, subject to the following limitations: The Declarant Control Period shall terminate sixty days after conveyance of one hundred percent of the Lots that may be created in the Development to Owners other than the Declarant. The Declarant may assign its rights under this subsection to or share such rights with one or more other persons, exclusively, simultaneously or consecutively.

#### **6. ARTICLE 6 - AMENDMENT**

6.1. This declaration may be amended or repealed only by duly recording a written instrument which contains an agreement providing for termination, revocation or amendment which is signed by not less than seventy-five percent (75%) of the Lot owners. The Declarant shall have the right to amend this declaration by recording an amendment thereto at any time until Declarant has sold all Lots owned by the Declarant. No amendment may affect the obligation of the Owners and/or the Association to maintain the storm water infrastructure, unless the City of Sedro Woolley has consented to such amendment.

#### **7. ARTICLE 7 - COVENANTS RUNNING WITH THE LAND**

7.1. Duration. The covenants, conditions and restrictions contained herein shall run with the property described herein and shall be binding upon all parties and persons in perpetuity.

7.2. Obligations Perpetual. The Association shall maintain the storm water infrastructure and all common areas in perpetuity. The Board of the Association shall annually develop its budget in such a fashion that the costs of operations and maintenance of storm water infrastructure and all common areas can be borne by the Association without the need for a special assessment.

#### **8. ARTICLE 8 - NOTICES**

8.1 Any notice permitted or required to be delivered under the provisions of this declaration, may be delivered either personally or by mail. If delivery is by mail, such notice shall be deemed to have been delivered forty-eight (48) hours after a copy has been deposited in the united states mail, postage prepaid for first class mail, addressed to the person entitled to such notice at the most recent mailing address shown for the Lot on the Skagit County Assessor's records.

#### **9. ARTICLE 9 - SEVERABILITY**

Declaration of Covenants, Conditions and Restrictions  
Arbor Glen  
Page - 8 -

9.1. The provisions hereof shall be deemed independent and severable, and the invalidity or partial invalidity or enforceability of any one provision or portion hereof shall not affect the validity or enforceability of any other provision hereof.

10. ARTICLE 10 – INTERPRETATION

10.1. The provisions of this declaration shall be liberally construed to effectuate its purposes to create a uniform plan for the development and operation of the property.

11. ARTICLE 11 - EFFECTIVE DATE

11.1. This declaration shall take effect upon recording with the Skagit County Auditor.

Dated this 21 day of June, 2019.

GRANITE HOLDINGS, L.L.C.

By:

[Signature]  
ROBERT RUBY, Its: MANAGER

State of Washington )  
                                  ) ss  
County of Skagit        )

I certify that I know or have satisfactory evidence that ROBERT RUBY is the person who appeared before me, and said person acknowledged that he/she signed this instrument, on oath stated that he/she was authorized to execute the instrument and acknowledged it as the MANAGER of GRANITE HOLDINGS, LLC, a Washington limited liability company, to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.



Dated: 6/21/19  
[Signature]  
(Signature)  
NOTARY PUBLIC  
Brenden D. Jones  
Print Name of Notary  
My appointment expires: Apr 1, 2023

## APPENDIX "A" - LEGAL DESCRIPTION

Lots 1-19 inclusive, Plat of Arbor Glen No. Sedro Woolley Plat #2017-330,  
approved June 24, 2019 and recorded June 24, 2019, under Skagit  
County Auditor's File No. 201906240188.

Situate in the City of Sedro Woolley, County of Skagit, State of Washington.

Appendix "A"

## Permanent Stormwater Control Facilities Operation and Maintenance (O&M) Manual

for:

*Arbor Glen*

Located at:  
*755 Cook Road  
(600-629 Stacey Place)*

Prepared for:

***Granite Holdings***

Prepared by:

*Sound Development Group, LLC*

*Grantor – Granite Holdings, LLC  
133 State Street #34  
Sedro-Woolley, WA 98284*

*Grantee – Sedro-Woolley Public  
Parcel Number – P76912  
Sec/Twp/Rng - Section 23, Township 35 North, Range 4 East*



## STORMWATER SYSTEM MAINTENANCE PLAN FOR Arbor Glen

### 1.0 Introduction

The intent of this stormwater maintenance manual is to provide the owners and HOA, assistance in performing proper maintenance of their stormwater facilities.

The stormwater drainage system designed and constructed for Arbor Glen Development, is located to the east and west of Stacey Place, within and out of the ROW corridor, as well as along the north, south, east and west of the homes, on each lot.

Maintenance of the drainage system is of primary importance in order to ensure that the infiltration trenches function as originally designed. It is the sole responsibility of the property owner to maintain and repair the systems, as required.

The system shall be maintained in conformity with applicable sections of the Stormwater Management Manual for Western Washington (excerpts attached), and the requirements of the City of Sedro-Woolley. See attached checklists for requirements.

Stormwater management facilities onsite consist of collection and conveyance systems, infiltration and treatment facilities. The combination will convey and treat the stormwater runoff from the site, as well as infiltrated the water into the existing native soils.

Record construction drawings are attached in Appendix B, and should be consulted for pipe size and material and existing easements.

Record Construction drawings should be consulted during maintenance, inspection and repair activities.

## 2.0 Stormwater Management Facilities

It is useful to have a general knowledge of how the stormwater management facilities on site function, to better understand the facility's maintenance requirements. There are three components to the existing system: collection / conveyance, quantity and quality control.

The on-site permanent stormwater facilities to be maintained by the plat of Arbor Glen consist of common storm drains, common roof drains, rain gardens, bioretention cells, storm filters, and the associated plantings, except any such items which are dedicated to, owned by or maintained by the City of Sedro-Woolley. The stormwater facilities that will be dedicated to and maintained by the City of Sedro-Woolley do not include the storm water filter unit, but will include all stormwater facilities (catch basins and pipes) located in and between the curb lines of Stacey Place.

### 2.1 Collection and Conveyance Systems

Collection and conveyance systems intercept and transport stormwater, and consist of catch basin inlets, curb cuts that collect water, swales/ditches and pipes (solid and perforated) that convey the water. Stormwater conveyance systems are designed to provide adequate capacity for the site. Typical failures include reduced capacity due to clogged catch basin grates or pipes. Plugging commonly occurs due to sediment and large debris washed down from adjacent surfaces. Reduced conveyance system capacity can result in localized flooding.

### 2.2 Stormwater Quality Control

Stormwater treatment facilities onsite provide sediment settling and filtration through treatment soils and vegetation, and a single mechanical treatment Stormfilter. Stormwater treatment facilities have limited treatment capability, and are not intended to replace proper site management. The most effective technique for reducing pollutant discharge from the site is to provide good housekeeping through source control Best Management Practices, provided in Appendix A.

### 2.3 Stormwater Quantity Control

Stormwater flow control facilities onsite provide mitigation for the additional runoff that the development will create. Stormwater control facilities are engineered to detain and/or infiltrate stormwater runoff.

### 3.0 Facility Descriptions

Each of the following subsections includes a facility description. The required maintenance and checklists can be found in Appendices D through H – Maintenance Checklists.

The underground infiltration facilities have no direct maintenance available. This is why maintaining the facilities up stream of the infiltration, is so important.

- 3.1 Catch Basins / Area Drains
- 3.2 Fencing / Shrubbery / Landscaping
- 3.3 Roof Downspouts
- 3.4 Bioretention Cells
- 3.5 Stormfilter

#### 3.1 Catch Basins / Area Drains and Flow Control Structure Catch Basin

Catch basins are underground concrete structures typically provided with a slotted grate to collect stormwater runoff and route it through underground pipes.

A Type 1 and 1L are rectangular structures, utilized when the connected pipes are less than 18" in diameter and the depth from the grate to the bottom of the lowest pipe is less than 5 feet.

A Type 2 catch basin is a round structure, ranging in diameter of 4 to 8 feet, and is utilized when the connecting pipes are 18" or greater in diameter, or the depth from grate to bottom of the lowest pipe exceeds 5 feet. They will typically have a ladder mounted on the inside of the structure to allow for access and maintenance.

A Burlington basin or other localized area drain is a small rectangular or round structure, utilized at intersections or directional changes for roofdrains, yard drains, or other small diameter pipes.

A cleanout is an access point to a junction or end of pipe. It is typically the same diameter of the pipe it is connected to, and gives access for flow observation, water level observation (in underground infiltration systems) and the ability to flush a pipe out with high velocity flow.

All catch basin types typically provide a storage volume below the outlet pipe, called a sump, to allow sediments and debris to settle out of the stormwater runoff.

The most common cleaning method for catch basin sumps is to utilize a truck with a tank and vacuum hose (vactor truck) to remove sediment and debris buildup from the sump. Catch basins are an enclosed space, where vapors can accumulate. If the inspection or cleaning requires entering the catch basin, it should be conducted by an individual with training and certification in working in hazardous, confined spaces.

There are sixteen (16) catch basins on-site: fifteen (15) Type I or 1L and one (1) Type 2.

### 3.2 Shrubbery / Landscaping

Landscaping is an essential component of stormwater management. Bare soil areas generate higher levels of stormwater runoff and sedimentation in stormwater facilities. There are many landscaped areas on site, that are prone to erosion if not maintained.

Landscaping and vegetation should be maintained, deleterious plants and materials removed. Erosion or other types of soil disturbance should be remedied on a regular basis, and new mulch applied yearly.

See Appendix E for maintenance items and schedule.

### 3.3 Building Downspouts

Building downspouts connect the building's roof gutters to the storm conveyance/infiltration systems. Due to minimal pipe slope from the downspout pipe to the underground storm system, these need to be inspected each year and jetted if a build up of deleterious material is found. Jetting shall occur from the cleanout to a downstream CB, prior to the infiltration system. Jetting shall not occur through perforated storm pipe.

Gutters must be maintained and kept clean and free of silt and deleterious organics.

See Appendix F for maintenance items and schedule.

### 3.4 Bioretention Cells

Bioretention cells are localized depressions within the landscaped areas, that can collect runoff from the adjoining impervious areas. These shallow ponding areas are constructed with an engineered soil mix and plantings, that treat the stormwater as the stormwater infiltrates through the system's soils, into an underlying rock reservoir and pipe underdrain.

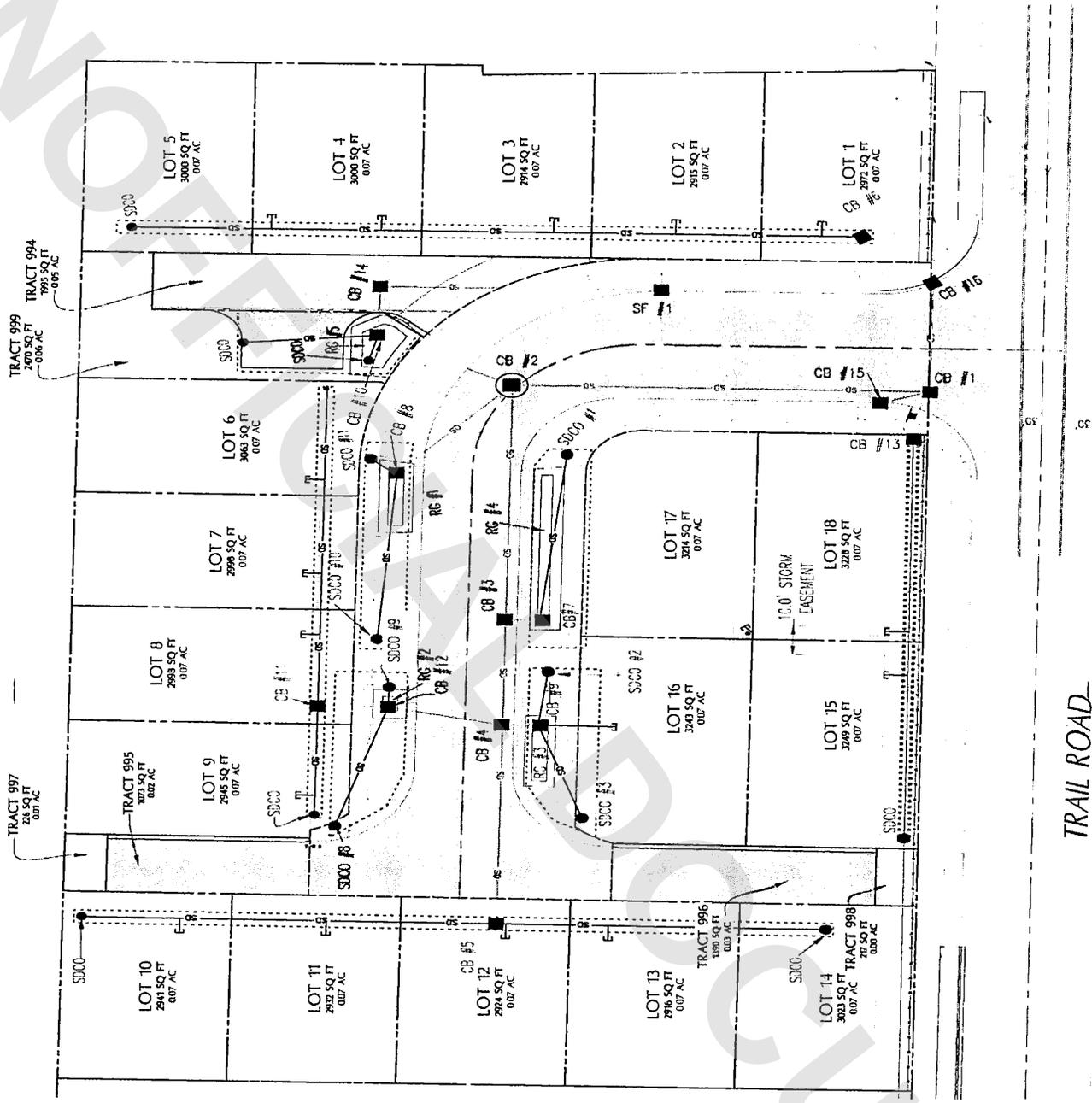
The bioretention cells both treat the stormwater they catch, and provide a small amount of detention within the cell and underlying rock reservoir, while infiltration into the underlying soils occurs.

There are five (5) bioretention cells on site. Typical maintenance of bioretention cells includes removal of trash, debris, deleterious plants/weeds, soil maintenance, and renewal of plants and mulch/organic soils within the bottom.

See Appendix G for maintenance items and schedule.

### 3.5 Stormfilter

The Stormfilter unit (noted as SF #1) is a treatment facility within a catch basin type structure. Though it does lie between the curbs of Stacey Place, maintenance of the Stormfilter is the responsibility of the HOA, not the City. The unit contains filters, that must be inspected and replaced periodically, per the Stormfilter guidelines, found in Appendix H.



TRAIL ROAD

#### **4.0 Maintenance Responsibilities and Reporting**

All permanent stormwater facilities: conveyance systems with catch basins and pipes, infiltration galleries, bioretention cells and rain gardens, and Contech Stormfilter unit, both within the road right-of-way and on tracts and lots, shall be maintained in perpetuity in a manner that allows them to function as originally designed.

The owner, its designated representative (third-party) or homeowner's association, is solely responsible for the inspection, maintenance, repair and replacement of all private permanent stormwater facilities located outside of the roadway, on tracts or lots, and any and all costs associated therewith. The public conveyance system located in the roadway will be owned and maintained by the City.

The owner, association, or its designated representative shall submit an annual operation and maintenance report for the permanent stormwater facilities, to the City of Sedro-Woolley Public Works Department, on or before March 31<sup>st</sup> of each year for the previous year's inspections and maintenance activities. The report shall include any remedial actions taken, how the actions were completed, who performed them, any problems encountered and any required follow-up actions such as maintenance, repair or replacement. Annual report and other maintenance records shall be maintained on-site and available to the City upon request.

The City shall have the right to enter onto the property for inspection and compliance purposes. Should inspection reports (either by the property owner/association or by the City) indicate the permanent stormwater facilities are not being properly maintained, or show signs of failure and the property owner has not remedied any maintenance standards exceedences, the City of Sedro-Woolley reserves the right but not the obligation to perform work that is necessary to maintain the permanent stormwater facilities that have not been maintained by the property owner or association, and recover any and all costs so incurred by the City from the property owner or association. Failure to properly maintain the permanent stormwater facilities may also result in City levied fines in accordance with Sedro-Woolley Municipal Code Title 13, Chapter 13.40.

#### **5.0 Source Control Best Management Practices**

Source control Best Management Practices address multiple situations that may occur at the proposed development. Source control of pollution can prevent damage to the onsite stormwater system and its components. Source control Best Management Practices can be found in Appendix A, and are listed below:

- Landscaping and Lawn/Vegetation Management (S411 BMP)
- Maintenance of Stormwater Drainage and Treatment Systems (S417 BMP)
- Roof / Building Drains at Manufacturing and Commercial Buildings (S424 BMP)
- Spills of Oil and Hazardous Substances (S426 BMP)

**Appendix A – Source Control Best Management Practices**

UNOFFICIAL DOCUMENT

**Applicable Operational BMPs:**

- Eliminate unpermitted wastewater discharges to storm sewer, ground water, or surface water.
- Convey unpermitted discharges to a sanitary sewer if allowed by the local sewer authority, or to other approved treatment.
- Obtain appropriate state and local permits for these discharges.

**Recommended Additional Operational BMPs:** At commercial and industrial facilities, conduct a survey of wastewater discharge connections to storm drains and to surface water as follows:

- Conduct a field survey of buildings, particularly older buildings, and other industrial areas to locate storm drains from buildings and paved surfaces. Note where these join the public storm drain(s).
- During non-stormwater conditions inspect each storm drain for non-stormwater discharges. Record the locations of all non-stormwater discharges. Include all permitted discharges.
- If useful, prepare a map of each area. Show on the map the known location of storm sewers, sanitary sewers, and permitted and unpermitted discharges. Aerial photos may be useful. Check records such as piping schematics to identify known side sewer connections and show these on the map. Consider using smoke, dye, or chemical analysis tests to detect connections between two conveyance systems (e.g., process water and stormwater). If desirable, conduct TV inspections of the storm drains and record the footage on videotape.
- Compare the observed locations of connections with the information on the map and revise the map accordingly. Note suspect connections that are inconsistent with the field survey.
- Identify all connections to storm sewers or to surface water and take the actions specified above as applicable BMPs.

**S411 BMPs for Landscaping and Lawn/ Vegetation Management**

**Description of Pollutant Sources:** Landscaping can include grading, soil transfer, vegetation removal, pesticide and fertilizer applications, and watering. Stormwater contaminants include toxic organic compounds, heavy metals, oils, total suspended solids, coliform bacteria, fertilizers, and pesticides.

Lawn and vegetation management can include control of objectionable weeds, insects, mold, bacteria, and other pests with pesticides. Examples include weed control on golf course lawns, access roads, and utility corridors and during landscaping; sap stain and insect control on lumber and logs; rooftop moss removal; killing nuisance rodents; fungicide application to patio decks, and residential lawn/plant care. It is possible to

release toxic pesticides such as pentachlorophenol, carbamates, and organometallics to the environment by leaching and dripping from treated parts, container leaks, product misuse, and outside storage of pesticide contaminated materials and equipment. Poor management of the vegetation and poor application of pesticides or fertilizers can cause appreciable stormwater contamination.

**Pollutant Control Approach:** Control of fertilizer and pesticide applications, soil erosion, and site debris to prevent contamination of stormwater.

Develop and implement an Integrated Pest Management Plan (IPM) and use pesticides only as a last resort. Carefully apply pesticides/ herbicides, in accordance with label instructions. Maintain appropriate vegetation, with proper fertilizer application where practicable, to control erosion and the discharge of stormwater pollutants. Where practicable grow plant species appropriate for the site, or adjust the soil properties of the subject site to grow desired plant species.

**Applicable Operational BMPs for Landscaping:**

- Install engineered soil/landscape systems to improve the infiltration and regulation of stormwater in landscaped areas.
- Do not dispose of collected vegetation into waterways or storm sewer systems.

**Recommended Additional Operational BMPs for Landscaping:**

- Conduct mulch-mowing whenever practicable
- Dispose of grass clippings, leaves, sticks, or other collected vegetation, by composting, if feasible.
- Use mulch or other erosion control measures on soils exposed for more than one week during the dry season or two days during the rainy season.
- Store and maintain appropriate oil and chemical spill cleanup materials in readily accessible locations when using oil or other chemicals. Ensure that employees are familiar with proper spill cleanup procedures.
- Till fertilizers into the soil rather than dumping or broadcasting onto the surface. Determine the proper fertilizer application rate for the types of soil and vegetation encountered.
- Till a topsoil mix or composted organic material into the soil to create a well-mixed transition layer that encourages deeper root systems and drought-resistant plants.
- Use manual and/or mechanical methods of vegetation removal rather than applying herbicides, where practical.

**Applicable Operational BMPs for the Use of Pesticides:**

- Develop and implement an IPM (See section on IPM in *Applicable Operational BMPs for Vegetation Management*) and use pesticides only as a last resort.
- Implement a pesticide-use plan and include at a minimum: a list of selected pesticides and their specific uses; brands, formulations, application methods and quantities to be used; equipment use and maintenance procedures; safety, storage, and disposal methods; and monitoring, record keeping, and public notice procedures. All procedures shall conform to the requirements of Chapter 17.21 RCW and Chapter 16-228 WAC (Appendix IV-D R.7).
- Choose the least toxic pesticide available that is capable of reducing the infestation to acceptable levels. The pesticide should readily degrade in the environment and/or have properties that strongly bind it to the soil. Conduct any pest control activity at the life stage when the pest is most vulnerable. For example, if it is necessary to use a Bacillus thuringiensis application to control tent caterpillars, apply it to the material before the caterpillars cocoon or it will be ineffective. Any method used should be site-specific and not used wholesale over a wide area.
- Apply the pesticide according to label directions. Do not apply pesticides in quantities that exceed manufacturer's instructions.
- Mix the pesticides and clean the application equipment in an area where accidental spills will not enter surface or ground waters, and will not contaminate the soil.
- Store pesticides in enclosed areas or in covered impervious containment. Do not discharge pesticide contaminated stormwater or spills/leaks of pesticides to storm sewers. Do not hose down the paved areas to a storm sewer or conveyance ditch. Store and maintain appropriate spill cleanup materials in a location known to all near the storage area.
- Clean up any spilled pesticides. Keep pesticide contaminated waste materials in designated covered and contained areas.
- The pesticide application equipment must be capable of immediate shutoff in the event of an emergency.
- Spraying pesticides within 100 feet of open waters including wetlands, ponds, and rivers, streams, creeks, sloughs and any drainage ditch or channel that leads to open water may have additional regulatory requirements beyond just following the pesticide product label. Additional requirements may include:
  - Obtaining a discharge permit from Ecology.
  - Obtaining a permit from the local jurisdiction.
  - Using an aquatic labeled pesticide.

- Flag all sensitive areas including wells, creeks, and wetlands prior to spraying.
- Post notices and delineate the spray area prior to the application, as required by the local jurisdiction or by Ecology.
- Conduct spray applications during weather conditions as specified in the label direction and applicable local and state regulations. Do not apply during rain or immediately before expected rain.

**Recommended Additional Operational BMPs for the use of pesticides:**

- Consider alternatives to the use of pesticides such as covering or harvesting weeds, substitute vegetative growth, and manual weed control/moss removal.
- Consider the use of soil amendments, such as compost, that are known to control some common diseases in plants, such as Pythium root rot, ashy stem blight, and parasitic nematodes. The following are three possible mechanisms for disease control by compost addition (USEPA Publication 530-F-9-044):
  1. Successful competition for nutrients by antibiotic production;
  2. Successful predation against pathogens by beneficial microorganism; and
  3. Activation of disease-resistant genes in plants by composts.

*Installing an amended soil/landscape system can preserve both the plant system and the soil system more effectively. This type of approach provides a soil/landscape system with adequate depth, permeability, and organic matter to sustain itself and continue working as an effective stormwater infiltration system and a sustainable nutrient cycle.*

- Once a pesticide is applied, evaluate its effectiveness for possible improvement. Records should be kept showing the effectiveness of the pesticides considered.
- Develop an annual evaluation procedure including a review of the effectiveness of pesticide applications, impact on buffers and sensitive areas (including potable wells), public concerns, and recent toxicological information on pesticides used/proposed for use. If individual or public potable wells are located in the proximity of commercial pesticide applications, contact the regional Ecology hydrogeologist to determine if additional pesticide application control measures are necessary.
- Rinseate from equipment cleaning and/or triple-rinsing of pesticide containers should be used as product or recycled into product.

*For more information, contact the Washington State University (WSU) Extension Home-Assist Program, (253) 445-4556, or Bio-Integral Resource Center (BIRC), P.O. Box 7414, Berkeley, CA.94707, or EPA to*

obtain a publication entitled "Suspended, Canceled, and Restricted Pesticides" which lists all restricted pesticides and the specific uses that are allowed.

**Applicable Operational BMPs for Vegetation Management:**

- Use at least an eight-inch "topsoil" layer with at least 8 percent organic matter to provide a sufficient vegetation-growing medium. Amending existing landscapes and turf systems by increasing the percent organic matter and depth of topsoil can substantially improve the permeability of the soil, the disease and drought resistance of the vegetation, and reduce fertilizer demand. This reduces the demand for fertilizers, herbicides, and pesticides. Organic matter is the least water-soluble form of nutrients that can be added to the soil. Composted organic matter generally releases only between 2 and 10 percent of its total nitrogen annually, and this release corresponds closely to the plant growth cycle. Return natural plant debris and mulch to the soil, to continue recycling nutrients indefinitely.
- Select the appropriate turfgrass mixture for the climate and soil type. Certain tall fescues and rye grasses resist insect attack because the symbiotic endophytic fungi found naturally in their tissues repel or kill common leaf and stem-eating lawn insects. However, they do not, repel root-feeding lawn pests such as Crane Fly larvae, and are toxic to ruminants such as cattle and sheep. The fungus causes no known adverse effects to the host plant or to humans. Endophytic grasses are commercially available; use them in areas such as parks or golf courses where grazing does not occur. Local agricultural or gardening resources such as Washington State University Extension office can offer advice on which types of grass are best suited to the area and soil type.
- Use the following seeding and planting BMPs, or equivalent BMPs to obtain information on grass mixtures, temporary and permanent seeding procedures, maintenance of a recently planted area, and fertilizer application rates: *Temporary and Permanent Seeding, Mulching, Plastic Covering, and Sodding* as described in Volume II.
- Adjusting the soil properties of the subject site can assist in selection of desired plant species. For example, design a constructed wetland to resist the invasion of reed canary grass by layering specific strata of organic matters (e.g., composted forest product residuals) and creating a mildly acidic pH and carbon-rich soil medium. Consult a soil restoration specialist for site-specific conditions.
- Aerate lawns regularly in areas of heavy use where the soil tends to become compacted. Conduct aeration while the grasses in the lawn are growing most vigorously. Remove layers of thatch greater than ¾-inch deep.

- Mowing is a stress-creating activity for turfgrass. Grass decreases its productivity when mown too short and there is less growth of roots and rhizomes. The turf becomes less tolerant of environmental stresses, more disease prone and more reliant on outside means such as pesticides, fertilizers, and irrigation to remain healthy. Set the mowing height at the highest acceptable level and mow at times and intervals designed to minimize stress on the turf. Generally mowing only 1/3 of the grass blade height will prevent stressing the turf.

***Irrigation:***

- The depth from which a plant normally extracts water depends on the rooting depth of the plant. Appropriately irrigated lawn grasses normally root in the top 6 to 12 inches of soil; lawns irrigated on a daily basis often root only in the top 1 inch of soil. Improper irrigation can encourage pest problems, leach nutrients, and make a lawn completely dependent on artificial watering. The amount of water applied depends on the normal rooting depth of the turfgrass species used, the available water holding capacity of the soil, and the efficiency of the irrigation system. Consult with the local water utility, Conservation District, or Cooperative Extension office to help determine optimum irrigation practices.

***Fertilizer Management:***

- Turfgrass is most responsive to nitrogen fertilization, followed by potassium and phosphorus. Fertilization needs vary by site depending on plant, soil, and climatic conditions. Evaluation of soil nutrient levels through regular testing ensures the best possible efficiency and economy of fertilization. For details on soils testing, contact the local Conservation District, a soils testing professional, or a Washington State University Extension office.
- Apply fertilizers in amounts appropriate for the target vegetation and at the time of year that minimizes losses to surface and ground waters. Do not fertilize when the soil is dry. Alternatively, do not apply fertilizers within three days prior to predicted rainfall. The longer the period between fertilizer application and either rainfall or irrigation, the less fertilizer runoff occurs.
- Use slow release fertilizers such as methylene urea, IDBU, or resin coated fertilizers when appropriate, generally in the spring. Use of slow release fertilizers is especially important in areas with sandy or gravelly soils.
- Time the fertilizer application to periods of maximum plant uptake. Ecology generally recommends application in the fall and spring, although Washington State University turf specialists recommend four fertilizer applications per year.

- Properly trained persons should apply all fertilizers. Apply no fertilizer at commercial and industrial facilities, to grass swales, filter strips, or buffer areas that drain to sensitive water bodies unless approved by the local jurisdiction.

### ***Integrated Pest Management***

An IPM program might consist of the following steps:

Step 1: Correctly identify problem pests and understand their life cycle

Step 2: Establish tolerance thresholds for pests.

Step 3: Monitor to detect and prevent pest problems.

Step 4: Modify the maintenance program to promote healthy plants and discourage pests.

Step 5: Use cultural, physical, mechanical or biological controls first if pests exceed the tolerance thresholds.

Step 6: Evaluate and record the effectiveness of the control and modify maintenance practices to support lawn or landscape recovery and prevent recurrence.

For an elaboration of these steps, refer to [Appendix IV-F](#).

## **S412 BMPs for Loading and Unloading Areas for Liquid or Solid Material**

**Description of Pollutant Sources:** Operators typically conduct loading/unloading of liquid and solid materials at industrial and commercial facilities at shipping and receiving, outside storage, fueling areas, etc. Materials transferred can include products, raw materials, intermediate products, waste materials, fuels, scrap metals, etc. Leaks and spills of fuels, oils, powders, organics, heavy metals, salts, acids, alkalis, etc. during transfer may cause stormwater contamination. Spills from hydraulic line breaks are a common problem at loading docks.

**Pollutant Control Approach:** Cover and contain the loading/unloading area where necessary to prevent run-on of stormwater and runoff of contaminated stormwater.

### **Applicable Operational BMPs:**

#### ***At All Loading/ Unloading Areas:***

- A significant amount of debris can accumulate at outside, uncovered loading/unloading areas. Sweep these surfaces frequently to remove loose material that could contaminate stormwater. Sweep areas temporarily covered after removal of the containers, logs, or other material covering the ground.
- Place drip pans, or other appropriate temporary containment device, at locations where leaks or spills may occur such as hose connections, hose reels and filler nozzles. Always use drip pans when making and

## S417 BMPs for Maintenance of Stormwater Drainage and Treatment Systems

**Description of Pollutant Sources:** Facilities include roadside catch basins on arterials and within residential areas, conveyance systems, detention facilities such as ponds and vaults, oil/water separators, biofilters, settling basins, infiltration systems, and all other types of stormwater treatment systems presented in Volume V. Oil and grease, hydrocarbons, debris, heavy metals, sediments and contaminated water are found in catch basins, oil and water separators, settling basins, etc.

**Pollutant Control Approach:** Provide maintenance and cleaning of debris, sediments, and oil from stormwater collection, conveyance, and treatment systems to obtain proper operation.

### Applicable Operational BMPs:

Maintain stormwater treatment facilities per the operations and maintenance (O&M) procedures presented in Section 4.6 of Volume V in addition to the following BMPs:

- Inspect and clean treatment BMPs, conveyance systems, and catch basins as needed, and determine necessary O&M improvements.
- Promptly repair any deterioration threatening the structural integrity of stormwater facilities. These include replacement of clean-out gates, catch basin lids, and rock in emergency spillways.
- Ensure adequacy of storm sewer capacities and prevent heavy sediment discharges to the sewer system.
- Regularly remove debris and sludge from BMPs used for peak-rate control, treatment, etc. and discharge to a sanitary sewer if approved by the sewer authority, or truck to an appropriate local or state government approved disposal site.
- Clean catch basins when the depth of deposits reaches 60 percent of the sump depth as measured from the bottom of basin to the invert of the lowest pipe into or out of the basin. However, in no case should there be less than six inches clearance from the debris surface to the invert of the lowest pipe. Some catch basins (for example, WSDOT Type 1L basins) may have as little as 12 inches sediment storage below the invert. These catch basins need frequent inspection and cleaning to prevent scouring. Where these catch basins are part of a stormwater collection and treatment system, the system

owner/operator may choose to concentrate maintenance efforts on downstream control devices as part of a systems approach.

- Clean woody debris in a catch basin as frequently as needed to ensure proper operation of the catchbasin.
- Post warning signs; “Dump No Waste - Drains to Ground Water,” “Streams,” “Lakes,” or emboss on or adjacent to all storm drain inlets *where possible*.
- Disposal of sediments and liquids from the catch basins must comply with “Recommendations for Management of Street Wastes” described in Appendix IV-G of this volume.

**Additional Applicable BMPs:** Select additional applicable BMPs from this chapter depending on the pollutant sources and activities conducted at the facility. Those BMPs include:

- S425 BMPs for Soil Erosion and Sediment Control at Industrial Sites
- S427 BMPs for Storage of Liquid, Food Waste, or Dangerous Waste Containers
- S406 BMPs for Spills of Oil and Hazardous Substances
- S410 BMPs for Illicit Connections to Storm Drains
- S430 BMPs for Urban Streets

#### **S418 BMPs for Manufacturing Activities - Outside**

**Description of Pollutant Sources:** Manufacturing pollutant sources include outside process areas, stack emissions, and areas where manufacturing activity has taken place in the past and significant exposed pollutant materials remain.

**Pollution Control Approach:** Cover and contain outside manufacturing and prevent stormwater run-on and contamination, where feasible.

**Applicable Operational BMP:**

- Sweep paved areas regularly, as needed, to prevent contamination of stormwater.
- Alter the activity by eliminating or minimizing the contamination of stormwater.
- **Applicable Structural Source Control BMPs:** Enclose the activity (see Figure 2.2.6): If possible, enclose the manufacturing activity in a building.
- Cover the activity and connect floor drains to a sanitary sewer, if approved by the local sewer authority. Berm or slope the floor as needed to prevent drainage of pollutants to outside areas. (Figure 2.2.7)

## S424 BMPs for Roof/ Building Drains at Manufacturing and Commercial Buildings

**Description of Pollutant Sources:** Stormwater runoff from roofs and sides of manufacturing and commercial buildings can be sources of pollutants caused by leaching of roofing materials, building vents, and other air emission sources. Research has identified vapors and entrained liquid and solid droplets/particles as potential pollutants in roof/building runoff. Metals, solvents, acidic/alkaline pH, BOD, and organics, are some of the pollutant constituents identified.

Ecology has performed a study on zinc in industrial stormwater. The study is presented in Ecology Publication 08-10-025 *Suggested Practices to reduce Zinc Concentrations in Industrial Stormwater Discharges*, website: <http://www.ecy.wa.gov/biblio/0810025.html>. The user should refer to this document for more details on addressing zinc in stormwater.

**Pollutant Control Approach:** Evaluate the potential sources of stormwater pollutants and apply source control BMPs where feasible.

### Applicable Operational Source Control BMPs:

- If leachates and/or emissions from buildings are suspected sources of stormwater pollutants, then sample and analyze the stormwater draining from the building.
- Sweep the area routinely to remove any zinc residuals.
- If a roof/building stormwater pollutant source is identified, implement appropriate source control measures such as air pollution control equipment, selection of materials, operational changes, material recycle, process changes, etc.

### Applicable Structural Source Control BMPs:

- Paint/coat the galvanized surfaces as described in Ecology Publication # 08-10-025.

### Applicable Treatment BMPs:

Treat runoff from roofs to the appropriate level. The facility may use enhanced treatment BMPs as described in Volume V of the SWMMWW. Some facilities regulated by the Industrial Stormwater General Permit, or local jurisdiction, may have requirements that cannot be achieved with enhanced treatment BMPs. In these cases, additional treatment measures may be required. A treatment method for meeting stringent requirements such as Chitosan-Enhanced Sand Filtration may be appropriate.

## S425 BMPs for Soil Erosion and Sediment Control at Industrial Sites

**Description of Pollutant Sources:** Industrial activities on soil areas; exposed and disturbed soils; steep grading; etc. can be sources of sediments that can contaminate stormwater runoff.

**Pollutant Control Approach:** Limit the exposure of erodible soil, stabilize, or cover erodible soil where necessary to prevent erosion, and/or provide treatment for stormwater contaminated with TSS caused by eroded soil.

### Applicable BMPs:

#### Cover Practice Options:

- Vegetative cover such as grass, trees, shrubs, on erodible soil areas.
- Covering with mats such as clear plastic, jute, synthetic fiber.
- Preservation of natural vegetation including grass, trees, shrubs, and vines.

#### Structural Practice Options:

- Vegetated swale
- Dike
- Silt fence
- Check dam
- Gravel filter berm
- Sedimentation basin
- Proper grading.

(For design information refer to Volume II, “Standards and Specifications for BMPs”).

## S426 BMPs for Spills of Oil and Hazardous Substances

**Description of Pollutant Sources:** Federal law requires owners or operators of facilities engaged in drilling, producing, gathering, storing, processing, transferring, distributing, refining, or consuming oil and/or oil products to have a Spill Prevention and Emergency Cleanup Plan (SPECP). The SPECP is required if the above ground storage capacity of the facility, is 1,320 gallons or more of oil. Additionally, the SPECP is required if any single container with a capacity in excess of 660 gallons and which, due to their location, could reasonably be expected to discharge oil in harmful quantities, as defined in 40 CFR Part 110, into or upon the navigable waters of the United States or adjoining shorelines {40 CFR 112.1 (b)}. Onshore and offshore facilities, which, due to their location, could not reasonably be expected to discharge oil into or upon

the navigable waters of the United States or adjoining shorelines are exempt from these regulations {40 CFR 112.1(1)(i)}. State Law requires owners of businesses that produce dangerous wastes to have a SPECP. These businesses should refer to Appendix IV-D R.6. The federal definition of oil is oil of any kind or any form, including, but not limited to petroleum, fuel oil, sludge, oil refuse, and oil mixed with wastes other than dredged spoil.

**Pollutant Control Approach:** Maintain, update, and implement a Spill Prevention and Emergency Cleanup Plan.

**Applicable Operational BMPs:** The businesses and public agencies identified in Appendix IV-A required to prepare and implement a Spill Prevention and Emergency Cleanup Plan shall implement the following:

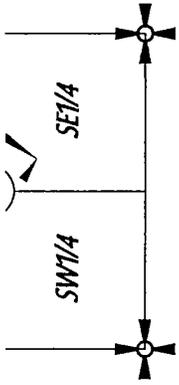
- Prepare a Spill Prevention and Emergency Cleanup Plan (SPECP), which includes:
  - A description of the facility including the owner's name and address.
  - The nature of the activity at the facility.
  - The general types of chemicals used or stored at the facility.
  - A site plan showing the location of storage areas for chemicals, the locations of storm drains, the areas draining to them, and the location and description of any devices to stop spills from leaving the site such as positive control valves.
  - Cleanup procedures.
  - Notification procedures used in the event of a spill, such as notifying key personnel. Agencies such as Ecology, local fire department, Washington State Patrol, and the local Sewer Authority, shall be notified.
  - The name of the designated person with overall spill cleanup and notification responsibility.
- Train key personnel in the implementation of the SPECP. Prepare a summary of the plan and post it at appropriate points in the building, identifying the spill cleanup coordinators, location of cleanup kits, and phone numbers of regulatory agencies to contact in the event of a spill.
- Update the SPECP regularly.
- Immediately notify Ecology, the local jurisdiction, and the local Sewer Authority if a spill may reach sanitary or storm sewers, ground water, or surface water, in accordance with federal and Ecology spill reporting requirements.

- Immediately clean up spills. Do not use emulsifiers for cleanup unless there is an appropriate disposal method for the resulting oily wastewater. Do not wash absorbent material down a floor drain or into a storm sewer.
- Locate emergency spill containment and cleanup kit(s) in high-potential spill areas. The contents of the kit shall be appropriate for the type and quantities of chemical liquids stored at the facility.

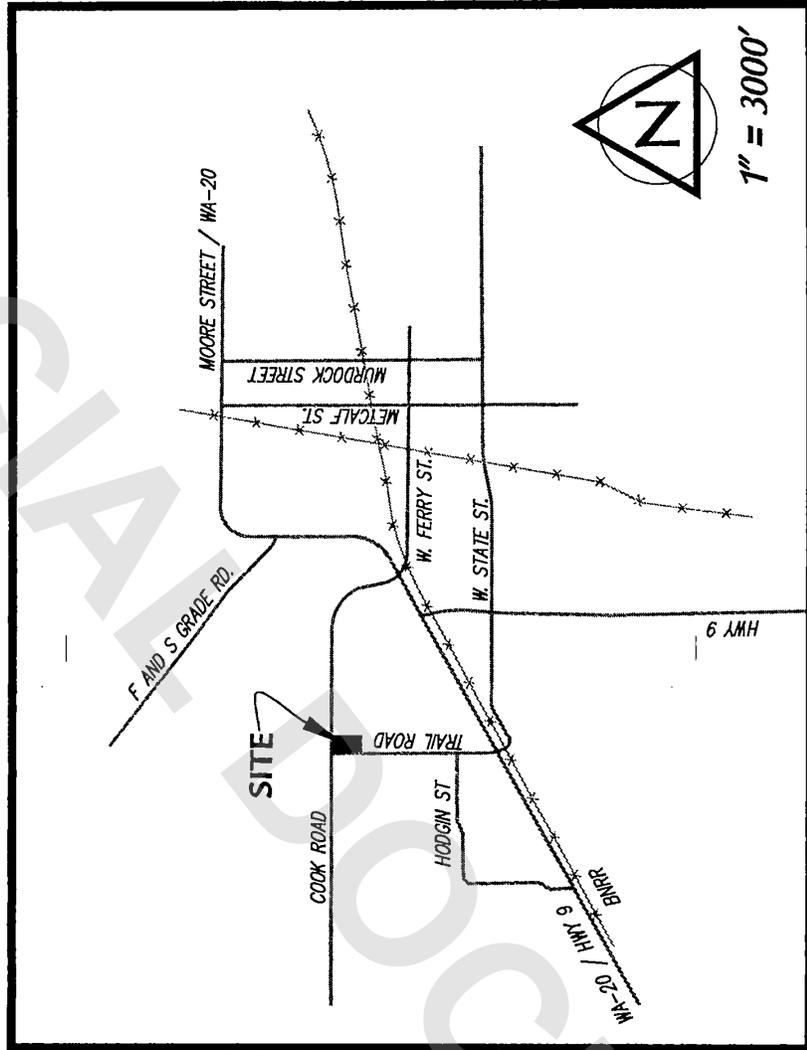
**Recommended Additional Operational BMP:** Spill kits should include appropriately lined drums, absorbent pads, and granular or powdered materials for neutralizing acids or alkaline liquids where applicable. In fueling areas: Package absorbent material in small bags for easy use and make available small drums for storage of absorbent and/or used absorbent. Deploy spill kits in a manner that allows rapid access and use by employees.

**Appendix B – As-built Construction Plans**

UNOFFICIAL DOCUMENT

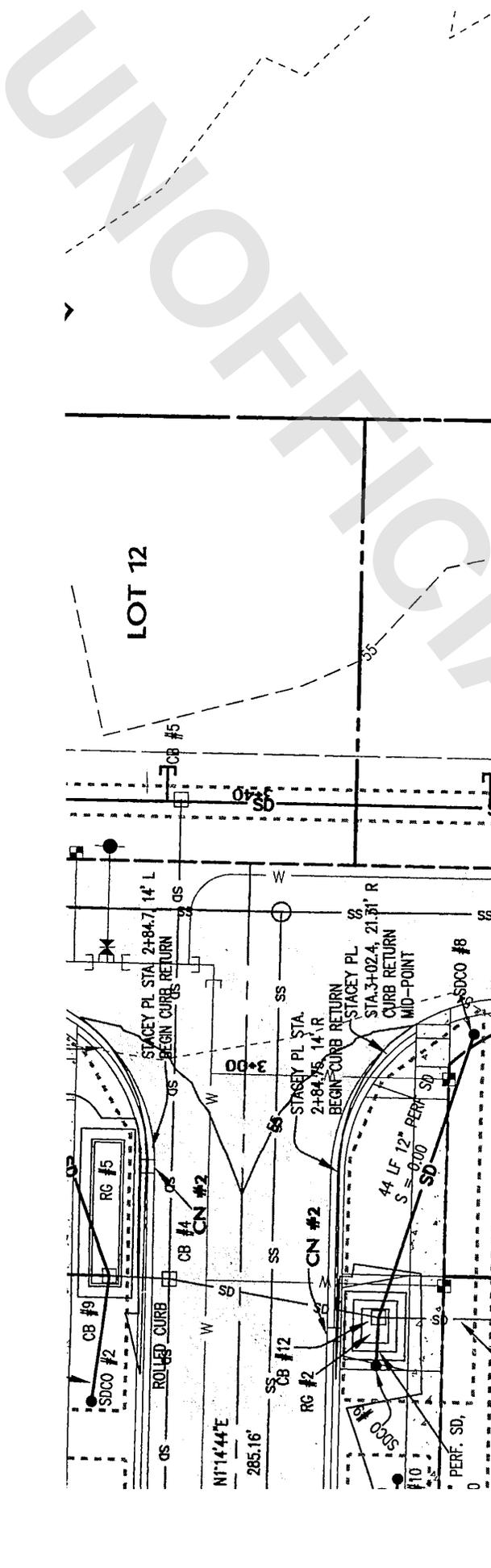


SECTION 23, TWP. 35 N., RGE. 4 E., W.M.



VICINITY MAP





LOT 12

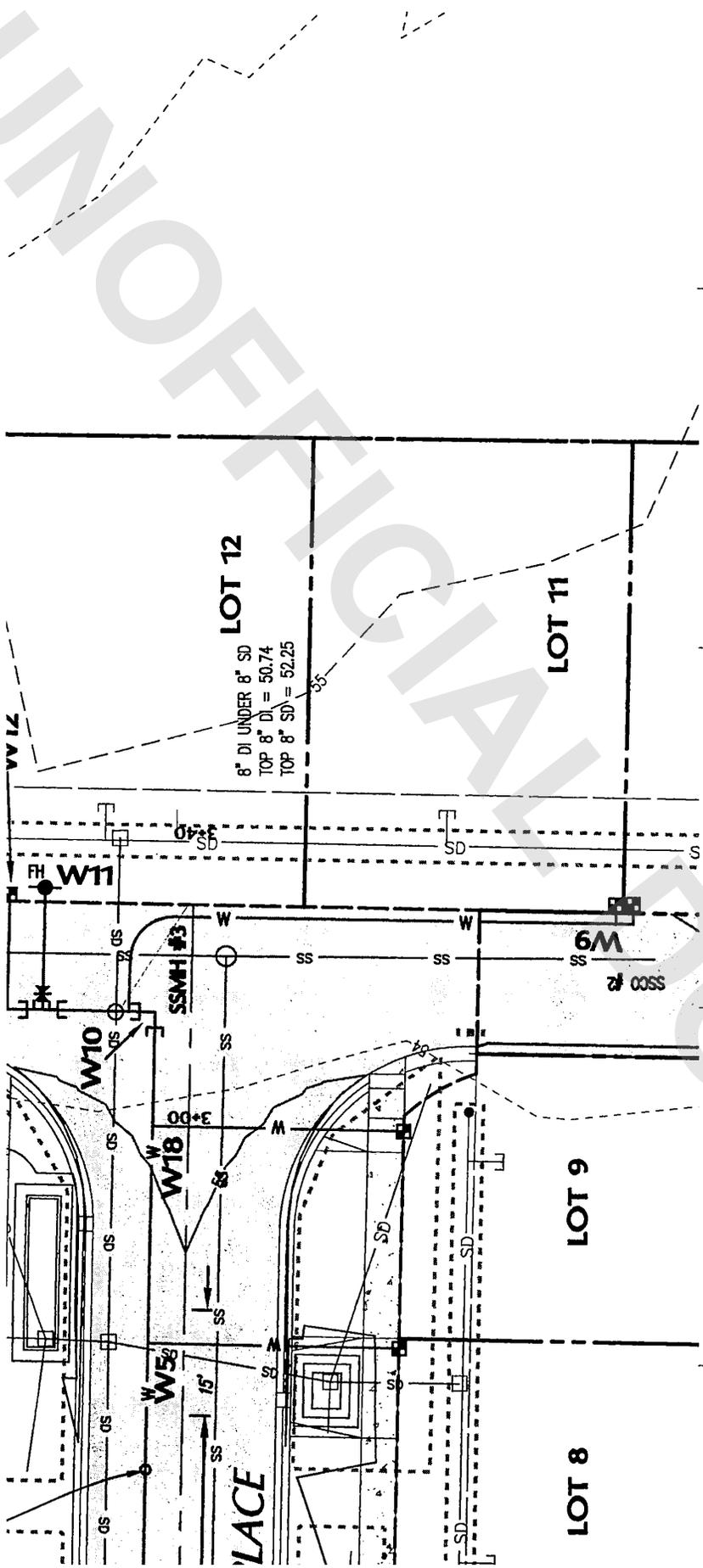
LOT 11

LOT 9  
STACEY PLACE STA.  
4+31.5, 40' R END  
ROLLED CURB,  
BEGIN ASPHALT  
THICKENED EDGE

LOT 8 FOR INFO  
12" SD, S=0.0267 CB #11  
SEE SHEET 5

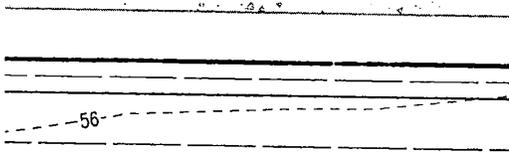
JATION

8, SOLID LOCKING LID RT	CB #4 - TYPE I, SOLID LOCKING LID STA 2+68.88, -10.00' LT RIM = 54.76 54.91 IE 8" SD IN, N = 51.35 50.74 IE 8" SD IN, E = 51.35 51.21 IE 8" SD IN, W = 51.35 51.21 IE 8" SD OUT, S = 51.35 50.74	CB #5 - TYPE I, SOLID LOCKING LID STA 3+38.52, -10.02' LT RIM = 54.44 55.24 IE 12" SD IN, E = 52.25 52.87 IE 12" SD IN, W = 52.25 52.89 IE 8" SD OUT, S = 52.25 52.86
50.61 50.32 50.61 50.32 54.00 50.72 = 50.61 50.32 0.005 0.011	10 LF 8" SD, S=0.0249 CB #9 TO CB #4	70 LF 8" SD, S=0.0129 0.0257
8" SD, S=0.0050 0.0119	RG5	APPROXIMATE WATER TABLE
RG1	RG6	
CB #3 - TYPE I, SOLID LOCKING LID STA 2+92.19, -10.00' LT RIM = 54.42 54.69 IE 8" SD IN, W = 50.00 50.85	82 LF 12" SD, S=0.0033 37 LF 8" SD, S=0.0123 0.0041 VCE STA: 2+56.28 VCE ELEV: 34.80	CB #9 - TYPE II, BEEHIVE GRATE STA 2+68.86, -20.02' LT RIM = 54.35 54.44 IE 8" SD OUT, E = 51.60 ✓
	RG2	
	RG3	
	RG4	
	RG5	
	RG6	
	RG7	
	RG8	
	RG9	
	RG10	
	RG11	
	RG12	
	RG13	
	RG14	
	RG15	
	RG16	
	RG17	
	RG18	
	RG19	
	RG20	
	RG21	
	RG22	
	RG23	
	RG24	
	RG25	
	RG26	
	RG27	
	RG28	
	RG29	
	RG30	
	RG31	
	RG32	
	RG33	
	RG34	
	RG35	
	RG36	
	RG37	
	RG38	
	RG39	
	RG40	
	RG41	
	RG42	
	RG43	
	RG44	
	RG45	
	RG46	
	RG47	
	RG48	
	RG49	
	RG50	
	RG51	
	RG52	
	RG53	
	RG54	
	RG55	
	RG56	
	RG57	
	RG58	
	RG59	
	RG60	
	RG61	
	RG62	
	RG63	
	RG64	
	RG65	
	RG66	
	RG67	
	RG68	
	RG69	
	RG70	
	RG71	
	RG72	
	RG73	
	RG74	
	RG75	
	RG76	
	RG77	
	RG78	
	RG79	
	RG80	
	RG81	
	RG82	
	RG83	
	RG84	
	RG85	
	RG86	
	RG87	
	RG88	
	RG89	
	RG90	
	RG91	
	RG92	
	RG93	
	RG94	
	RG95	
	RG96	
	RG97	
	RG98	
	RG99	
	RG100	

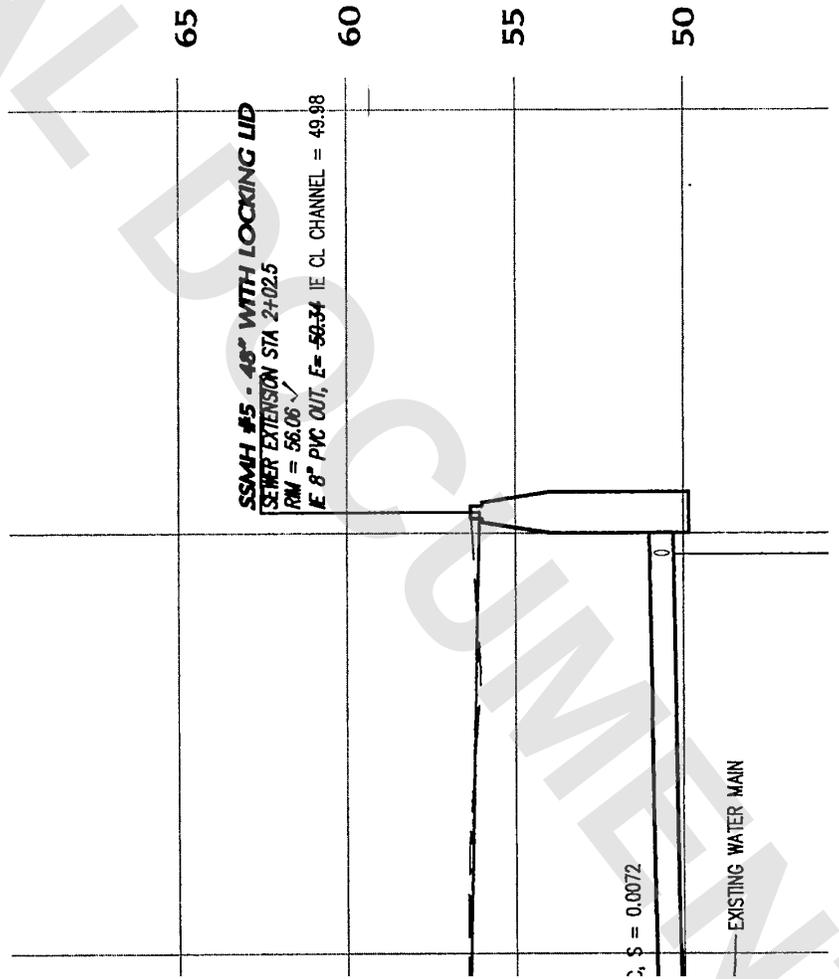
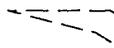


<p><b>SSCO #2</b>                  STA 34+22.7, 65' R                  RM = 55.83                  IE 8" PVC OUT, W = 49.73</p>	<p><b>SSMH #3 - 48" WITH LID</b>                  STA 34+22.7, 5' R                  RM = 55.39- 55.47                  IE 8" PVC OUT, S = 49.33                  IE 8" PVC IN, E = 49.43                  IE 8" PVC IN, W = 49.43                  CHANNEL CL = 48.90</p>	<p>121 LF 8" PVC, S = 0.004                  SSCO #2 TO SSMH #3                  PROPOSED 8" WATERLINE</p>
<p><b>LOT9 SS STUB</b> - STA 3+05.4, 5' R                  INSTALL: 1 - 8" X 6" PVC WYE                  IE @ 8" WYE = 49.33                  IE @ 6" WYE = 49.41                  41 LF 6" PVC, S = 0.020</p>	<p>INSTALL 6" PVC WYE W/ CLEANOUT                  @ PROPERTY LINE.                  INSTALL CAP &amp; MARKER POST 5'                  INSIDE PROPERTY LINE,                  IE 6" @ CAP = 50.23</p>	<p>8" WATERLINE IE = 51.42                  8" SD IE = 52.37</p>
<p><b>LOT 8 SS STUB</b> - STA 2+58.4, 5' R                  INSTALL: 1 - 8" X 6" PVC WYE                  IE @ 8" WYE = 48.94                  IE @ 6" WYE = 49.02</p>	<p>41 LF 6" PVC, S = 0.020                  INSTALL 6" PVC WYE WITH CLEANOUT AT                  PROPERTY LINE. INSTALL CAP &amp; MARKER                  POST 5' INSIDE PROPERTY LINE                  IE 6" @ CAP = 49.84</p>	<p>192 LF 8" SD, S = 0.0040                  0.0039</p>
<p><b>W/LOCKING LID</b></p>	<p>48.46                  48.56                  48.56                  .47</p>	

UNOFFICIAL



ROAD





**Appendix C – Inspector Form**

UNOFFICIAL DOCUMENT

Structure Checklist

Inspection Date: \_\_\_\_\_

Catch Basin / Structure / Item	Inspectors Initials	Inspection notes and actions taken
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
BIORETENTION CELLS		
1		
2		
3		
4		
5		











**Appendix D – Inspection Checklists - Catch Basins**

UNOFFICIAL DOCUMENT

Maintenance of Catch Basins		Date Inspected:		
Frequency	Maintenance Component	Defect	Condition When Maintenance is needed	
M S	General	Trash and Debris (Includes Sediment)	Material exceeds 25% of sump depth or 1 foot below orifice plate.	
		Structural Damage	Structure is not securely attached to manhole wall.	
			Structure is not in upright position (allow up to 10% from plumb)	
			Connections to outlet pipe are not watertight and show signs of rust.	
		Clean out Gate	Any holes—other than designed holes—in the structure	
			Clean out gate is not watertight or is missing.	
			Gate cannot be moved up and down by one maintenance person.	
			Chain/rod leading to gate is missing or damaged.	
		Orifice Plate	Damaged or missing	Gate is rusted over 50% of its surface area.
			Obstructions	Control device is not working properly due to missing out of place, or bent orifice plate Any trash, debris, sediment, or vegetation blocking the plate.
Overflow pipe	General	Obstruction	Any trash or debris blocking (or having the potential of blocking) the overflow pipe	
		Trash & Debris	Trash or debris which is located immediately in front of the catch basin opening or is blocking inlet capacity of the basin by more than 10%.	
A	General	Obstruction	Trash or debris (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of six inches clearance from the debris surface to the invert of the lowest pipe.	
			Trash or debris in any inlet or outlet pipe blocking more than 1/3 of its height.	
		Trash & Debris	Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).	
			Sediment (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of 6 inches clearance from the sediment surface to the invert of the lowest pipe.	
			Results Expected When Maintenance is Performed	
			Control structure orifice is not blocked. All trash and debris removed.	
			Structure securely attached to wall and outlet pipe.	
			Structure in correct position.	
			Connections to outlet pipe are water tight; structure repaired or replaced and works as designed.	
			Structure has no holes other than designed holes.	
			Gate is watertight and works as designed.	
			Gate moves up and down easily and is watertight	
			Chain is in place and works as designed	
			Gate is repaired or replaced to meet design standards.	
Plate is in place and works as designed.				
Plate is free of all obstructions and works as designed.				
Pipe is free of all obstruction and works as designed.				
No Trash or debris located immediately in front of catch basin or on grate opening.				
No trash or debris in the catch basin				
Inlet and outlet pipes free of trash or debris.				
No dead animals or vegetation present within the catch basin.				
No sediment in the catch basin.				
Measured from the bottom of basin to invert of the lowest pipe into or out of the basin.				

Maintenance of Catch Basins		Date Inspected:	
Structure Damage to Frame and/or Top Slab	Top slab has holes larger than 2 square inches or cracks wider than ¼ inch	Top slab is free of holes and cracks.	
	(Intent is to make sure no material is running into basin).		
	Frame not sitting flush on top slab, i.e., separation of more than ¼ inch of the frame from the top slab. Frame not securely attached.	Frame is sitting flush on the riser rings or top slab and firmly attached.	
	Maintenance person judges that structure is unsound.	Basin replaced or repaired to design standards.	
	Grout fillet has separated or cracked wider than ½ inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering catch basin through cracks.	Pipe is regrouted and secure at basin wall.	
	If failure of basin has created a safety, function, or design problem.	Basin replaced or repaired to design standards.	
	Vegetation growing across and blocking more than 10% of the basin opening.	No vegetation blocking opening to basin.	
	Vegetation growing in inlet/outlet pipe joints that is more than six inches tall and less than six inches apart.	No vegetation or root growth present.	
	Any evidence of oil, gasoline, contaminants or other pollutants.	No pollution present.	
A	Catch Basin Cover	Catch basin cover is closed.	
	Cover not in place.		
	open catch basin requires maintenance.		
	Mechanism cannot be opened by one maintenance person with proper tools. bolts into frame have less than ½ inch of thread.	Mechanism opens with proper tools.	
	One maintenance person cannot remove lid after applying normal lifting pressure. (intent is keep cover from sealing off access to maintenance.)	Cover can be removed by one maintenance person.	
A	Ladder	Ladder meets design standards and allows maintenance person safe access.	
	Ladder is unsafe due to missing rungs, not securely attached to basin wall, misalignment, rust, cracks, or sharp edges.		
M	Outlet Pipe	Outlet is free of trash, debris, or beaver dam blockage.	
	Trash, debris or any signs of beaver dam activity shall be removed upon inspection.		
A	Metal Grates	Grate opening meets design standards.	
	Grate with opening wider than 7/8 inch.		
M	(If	Grate free of trash and debris.	
S	Applicabl		
A	e)	Grate is in place and meets design standards.	
	Damaged or Missing		

A – Annually – preferably in September  
M – Monthly – from November through April  
S – After any major storm (1 inch in a 24 hour period)

Maintenance of Catch Basins

Date Inspected: \_\_\_\_\_

UNOFFICIAL DOCUMENT

**Appendix E – Inspection Checklists – Fencing / Shrubbery / Landscaping**

UNOFFICIAL DOCUMENT

**Shrubbery Screen/ Landscaping Date of Inspection:**

Frequency	Drainage System Feature	Problem	Conditions to Check For	Conditions That Should Exist
M	General	Dead shrubbery	Dead or dying plants	Plants should be removed and a native non-invasive type of vegetation replanted.
M	General	Unruly vegetation	Shrubbery is growing out of control or is infested with weeds.	Shrubbery is trimmed and weeded to provide appealing aesthetics. Do not use chemicals to control weeds.
A	General	Soil aeration	Soil vegetation should be kept from compaction, and well aerated.	If evidence of compaction, vehicle compaction, or other, soils should be re-aerated.
A	General	Mulch/Fertilizer	Organic soil levels (mulch) should be renewed each year.	Vegetation should be mulched yearly, with an approved mulch and organic content. Chemical fertilizers should not be used.

- A – Annually – preferably in September
- M – Monthly – from November through April
- S – After any major storm (1 inch in a 24 hour period)

### 5.3.2 Site Design BMPs

The two BMPs in this section are general practices for design and maintenance. They are listed here as an encouragement to project designers. The extent to which the concepts within these BMPs must be followed depends upon changes in the site development codes, rules, and standards adopted by the local government.

#### **BMP T5.40: Preserving Native Vegetation**

***Purpose and Definition***

Preserving native vegetation on-site to the maximum extent practicable will minimize the impacts of development on stormwater runoff. Preferably 65 percent or more of the development site should be protected for the purposes of retaining or enhancing existing forest cover and preserving wetlands and stream corridors.

***Applications and Limitations***

New development often takes place on tracts of forested land. In fact, building sites are often selected because of the presence of mature trees. However, unless sufficient care is taken and planning done, in the interval between buying the property and completing construction much of this resource is likely to be destroyed. The property owner is ultimately responsible for protecting as many trees as possible, with their understory and groundcover. This responsibility is usually exercised by agents, the planners, designers and contractors. It takes 20 to 30 years for newly planted trees to provide the benefits for which trees are so highly valued.

Forest and native growth areas allow rainwater to naturally percolate into the soil, recharging ground water for summer stream flows and reducing surface water runoff that creates erosion and flooding. Conifers can hold up to about 50 percent of all rain that falls during a storm. Twenty to 30 percent of this rain may never reach the ground but evaporates or is taken up by the tree. Forested and native growth areas also may be effective as stormwater buffers around smaller developments.

On lots that are one acre or greater, preservation of 65 percent or more of the site in native vegetation will allow the use of full dispersion techniques presented in [BMP T5.30](#). Sites that can fully disperse are not required to provide runoff treatment or flow control facilities.

***Design Guidelines***

- The preserved area should be situated to minimize the clearing of existing forest cover, to maximize the preservation of wetlands, and to buffer stream corridors.
- The preserved area should be placed in a separate tract or protected through recorded easements for individual lots.
- If feasible, the preserved area should be located downslope from the building sites, since flow control and water quality are enhanced by flow dispersion through duff, undisturbed soils, and native vegetation.

- The preserved area should be shown on all property maps and should be clearly marked during clearing and construction on the site.
- Vegetation and trees should not be removed from the natural growth retention area, except for approved timber harvest activities and the removal of dangerous and diseased trees.

#### *Maintenance*

### **BMP T5.41: Better Site Design**

#### *Purpose and Definition*

Fundamental hydrological concepts and stormwater management concepts can be applied at the site design phase that are:

- more integrated with natural topography,
- reinforce the hydrologic cycle,
- more aesthetically pleasing, and
- often less expensive to build.

A few site planning principles help to locate development on the least sensitive portions of a site and accommodate residential land use while mitigating its impact on stormwater quality.

#### *Design Guidelines*

- **Define Development Envelope and Protected Areas** - The first step in site planning is to define the development envelope. This is done by identifying protected areas, setbacks, easements and other site features, and by consulting applicable local standards and requirements. Site features to be protected may include important existing trees, steep slopes, erosive soils, riparian areas, or wetlands.

By keeping the development envelope compact, environmental impacts can be minimized, construction costs can be reduced, and many of the site's most attractive landscape features can be retained. In some cases, economics or other factors may not allow avoidance of all sensitive areas. In these cases, care can be taken to mitigate the impacts of development through site work and other landscape treatments.

- **Minimize Directly Connected Impervious Areas** - Impervious areas directly connected to the storm drain system are the greatest contributors to urban nonpoint source pollution. Any impervious surface that drains into a catch basin or other conveyance structure is a "directly connected impervious surface." As stormwater runoff flows across parking lots, roadways, and other paved areas, the oil, sediment, metals, and other pollutants are collected and concentrated. If this runoff is collected by a drainage structure and carried directly along impervious gutters or in sealed underground pipes, it has no opportunity for filtering by plant material or infiltration into the soil. It also increases in velocity and amount, causing increased peak-flows in the winter and decreased base-flows in the summer.

**Appendix F – Inspection Checklists – Roof Downspouts**

UNOFFICIAL DOCUMENT

Downspout Checklist

Date Inspected:

Frequency	Maintenance Component	Defect	Condition When Maintenance is needed	Results Expected When Maintenance is Performed
A, S	General	General	Gutters, downspouts and their connection points should be inspected for leakage, failure, blockage.	Free-flowing roof water being conveyed.
A	Catch basin/Structure connection	Blockage between downspout and downstream structure connection.	Water is not freely flowing from downspout to downstream connection point/structure. See CB inspection checklist. Do NOT force with air or water the blockage downstream into the infiltration facility, unless the inlet pipe to the infiltration facility has been completely blocked, and the CB or structure is then vacuummed.	Outlet to downstream structure is clear, water freely flowing.

A - Annually - preferably in September  
 M - Monthly - from November through April  
 S - After any major storm (1 inch in a 24 hour period)  
 BW - Bi-weekly  
 D - Daily

**Appendix G – Inspection Checklists – Bioretention Cells**

UNOFFICIAL DOCUMENT

Maintenance of Bioretention		Date Inspected:		
Frequency	Maintenance Component	Defect	Condition When Maintenance is needed	
M S A	General	Trash and Debris	Trash and debris accumulated in the bio-swale.	Results Expected When Maintenance is Performed Trash and debris cleared from swale.
		Sediment Accumulation on Grass	Sediment Depth exceeds 2 inches	Remove sediment deposits on grass treatment area of the bio-swale. When finished, swale should be level from side to side and drain freely toward outlet. There should be no areas of standing water once inflow has ceased.
		Standing Water	When water stands in swale between storms and does not drain freely.	Any of the following may apply: remove sediment or trash blockages; improve grade from head to foot of swale, remove clogged check dams, add underdrains or convert to a wet biofiltration swale.
		Flow Spreader	Flow spreader uneven or clogged so that flows are not uniformly distributed through entire swale depth.	Level the spreader and clean so that flows are spread evenly over entire swale width.
		Constant Baseflow	When small quantities of water continually flow through the swale, even when it has been dry for weeks, and an eroded, muddy channel has formed in the swale bottom.	Add a low flow pea gravel drain the length of the swale or bypass the baseflow around the swale.
		Poor Vegetation Cover	When grass is sparse or bare or eroded patches occur in more than 10% of the swale bottom.	Determine why grass growth is poor and correct that condition. Re-plant with plugs of grass from the upper slope; plant in the swale bottom at 8" intervals, or reseed into loosened fertile soil.
		Vegetation	When the grass becomes excessively tall (greater than 10"); when nuisance weeds and other vegetation starts to take over.	Mow vegetation or remove nuisance vegetation so that flow not impeded. Grass should be mowed to a height of 3 to 4 inches. Remove grass clippings.
		Excessive Shading	Grass growth is poor because sunlight does not reach swale.	If possible, trim back over hanging limbs and remove brushy vegetation on adjacent slopes.
		Inlet/Outlet	Inlet/Outlet clogged with sediment and/or debris	Remove material so that there is no clogging or blockage in the inlet and outlet area.
		Trash & Debris / Sediment in downstream catch basins	Sediment (in the basin) that exceeds 50 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of 6 inches clearance from the sediment surface to the invert of the lowest pipe. Measured from the bottom of basin to invert of the lowest pipe into or out of the basin.	No sediment in the catch basins.
		Erosion / Scouring	Eroded or scoured swale bottom due to flow channelization, or higher flows	For ruts or bare areas less than 12" wide, repair the damaged area by filling with crushed gravel. If bare areas are large, generally greater than 12" wide, the swale should be regraded and reseeded. For smaller bare areas, overseed when bare spots are evident, or take plugs of grass from the upper slope and plant in the swale bottom at 8" intervals.

A - Annually - preferably in September  
M - Monthly - from November through April  
S - After any major storm (1 inch in a 24 hour period)

must be supplied from the BSM that will be placed in the bioretention areas.

If testing infiltration rates is necessary for post-construction verification use the Pilot Infiltration Test (PIT) method or a double ring infiltrometer test (or other small-scale testing allowed by the local government with jurisdiction). If using the PIT method, do not excavate Bioretention Soil Mix (conduct test at level of finished Bioretention Soil Mix elevation), use a maximum of 6 inch ponding depth and conduct test before plants are installed.

### ***Maintenance***

Bioretention areas require annual plant, soil, and mulch layer maintenance to ensure optimum infiltration, storage, and pollutant removal capabilities. In general, bioretention maintenance requirements are typical landscape care procedures and include:

- **Watering:** Plants should be selected to be drought tolerant and not require watering after establishment (2 to 3 years). Watering may be required during prolonged dry periods after plants are established.
- **Erosion control:** Inspect flow entrances, ponding area, and surface overflow areas periodically, and replace soil, plant material, and/or mulch layer in areas if erosion has occurred. Properly designed facilities with appropriate flow velocities should not have erosion problems except perhaps in extreme events. If erosion problems occur the following should be reassessed: (1) flow volumes from contributing areas and bioretention cell sizing; (2) flow velocities and gradients within the cell; and (3) flow dissipation and erosion protection strategies in the pretreatment area and flow entrance. If sediment is deposited in the bioretention area, immediately determine the source within the contributing area, stabilize, and remove excess surface deposits.
- **Sediment removal:** Follow the maintenance plan schedule for visual inspection and remove sediment if the volume of the ponding area has been compromised.
- **Plant material:** Depending on aesthetic requirements, occasional pruning and removing dead plant material may be necessary. Replace all dead plants and if specific plants have a high mortality rate, assess the cause and replace with appropriate species. Periodic weeding is necessary until plants are established.
- **Weeding:** Invasive or nuisance plants should be removed regularly and not allowed to accumulate and exclude planted species. At a minimum, schedule weeding with inspections to coincide with important horticultural cycles (e.g., prior to major weed varieties dispersing seeds). Weeding should be done manually and without herbicide applications. The weeding schedule should become less frequent if the appropriate plant species and planting density are used and the selected plants grow to capture the site and exclude undesirable weeds.

- Nutrient and pesticides: The soil mix and plants are selected for optimum fertility, plant establishment, and growth. Nutrient and pesticide inputs should not be required and may degrade the pollutant processing capability of the bioretention area, as well as contribute pollutant loads to receiving waters. By design, bioretention facilities are located in areas where phosphorous and nitrogen levels may be elevated and these should not be limiting nutrients. If in question, have soil analyzed for fertility.
- Mulch: Replace mulch annually in bioretention facilities where heavy metal deposition is high (e.g., contributing areas that include gas stations, ports and roads with high traffic loads). In residential settings or other areas where metals or other pollutant loads are not anticipated to be high, replace or add mulch as needed (likely 3 to 5 years) to maintain a 2 to 3 inch depth.

Soil: Soil mixes for bioretention facilities are designed to maintain long-term fertility and pollutant processing capability. Estimates from metal attenuation research suggest that metal accumulation should not present an environmental concern for at least 20 years in bioretention systems, but this will vary according to pollutant load. Replacing mulch media in bioretention facilities where heavy metal deposition is likely provides an additional level of protection for prolonged performance. If in question, have soil analyzed for fertility and pollutant levels.

#### **BMP T7.40: Compost-amended Vegetated Filter Strips (CAVFS)**

##### ***Description***

The CAVFS is a variation of the basic vegetated filter strip that adds soil amendments to the roadside embankment (See [Figure 7.4.3](#)). The soil amendments improve infiltration characteristics, increase surface roughness, and improve plant sustainability. Once permanent vegetation is established, the advantages of the CAVFS are higher surface roughness; greater retention and infiltration capacity; improved removal of soluble cationic contaminants through sorption; improved overall vegetative health; and a reduction of invasive weeds. Compost-amended systems have somewhat higher construction costs due to more expensive materials, but require less land area for runoff treatment, which can reduce overall costs.

**Appendix H – Inspection and Maintenance requirements – Stormfilter**

UNOFFICIAL DOCUMENT



# StormFilter Inspection and Maintenance Procedures



## Maintenance Guidelines

The primary purpose of the Stormwater Management StormFilter® is to filter and prevent pollutants from entering our waterways. Like any effective filtration system, periodically these pollutants must be removed to restore the StormFilter to its full efficiency and effectiveness.

Maintenance requirements and frequency are dependent on the pollutant load characteristics of each site. Maintenance activities may be required in the event of a chemical spill or due to excessive sediment loading from site erosion or extreme storms. It is a good practice to inspect the system after major storm events.

## Maintenance Procedures

Although there are many effective maintenance options, we believe the following procedure to be efficient, using common equipment and existing maintenance protocols. The following two-step procedure is recommended::

### 1. Inspection

- Inspection of the vault interior to determine the need for maintenance.

### 2. Maintenance

- Cartridge replacement
- Sediment removal

## Inspection and Maintenance Timing

At least one scheduled inspection should take place per year with maintenance following as warranted.

First, an inspection should be done before the winter season. During the inspection the need for maintenance should be determined and, if disposal during maintenance will be required, samples of the accumulated sediments and media should be obtained.

Second, if warranted, a maintenance (replacement of the filter cartridges and removal of accumulated sediments) should be performed during periods of dry weather.



In addition to these two activities, it is important to check the condition of the StormFilter unit after major storms for potential damage caused by high flows and for high sediment accumulation that may be caused by localized erosion in the drainage area. It may be necessary to adjust the inspection/maintenance schedule depending on the actual operating conditions encountered by the system. In general, inspection activities can be conducted at any time, and maintenance should occur, if warranted, during dryer months in late summer to early fall.

## Maintenance Frequency

The primary factor for determining frequency of maintenance for the StormFilter is sediment loading.

A properly functioning system will remove solids from water by trapping particulates in the porous structure of the filter media inside the cartridges. The flow through the system will naturally decrease as more and more particulates are trapped. Eventually the flow through the cartridges will be low enough to require replacement. It may be possible to extend the usable span of the cartridges by removing sediment from upstream trapping devices on a routine as-needed basis, in order to prevent material from being re-suspended and discharged to the StormFilter treatment system.

The average maintenance lifecycle is approximately 1-5 years. Site conditions greatly influence maintenance requirements. StormFilter units located in areas with erosion or active construction may need to be inspected and maintained more often than those with fully stabilized surface conditions.

Regulatory requirements of a chemical spill can shift maintenance timing as well. The maintenance frequency may be adjusted as additional monitoring information becomes available during the inspection program. Areas that develop known problems should be inspected more frequently than areas that demonstrate no problems, particularly after major storms. Ultimately, inspection and maintenance activities should be scheduled based on the historic records and characteristics of an individual StormFilter system or site. It is recommended that the site owner develop a database to properly manage StormFilter inspection and maintenance programs..



## Inspection Procedures

The primary goal of an inspection is to assess the condition of the cartridges relative to the level of visual sediment loading as it relates to decreased treatment capacity. It may be desirable to conduct this inspection during a storm to observe the relative flow through the filter cartridges. If the submerged cartridges are severely plugged, then typically large amounts of sediments will be present and very little flow will be discharged from the drainage pipes. If this is the case, then maintenance is warranted and the cartridges need to be replaced.

**Warning:** In the case of a spill, the worker should abort inspection activities until the proper guidance is obtained. Notify the local hazard control agency and Contech Engineered Solutions immediately.

To conduct an inspection:

**Important:** Inspection should be performed by a person who is familiar with the operation and configuration of the StormFilter treatment unit.

1. If applicable, set up safety equipment to protect and notify surrounding vehicle and pedestrian traffic.
2. Visually inspect the external condition of the unit and take notes concerning defects/problems.
3. Open the access portals to the vault and allow the system vent.
4. Without entering the vault, visually inspect the inside of the unit, and note accumulations of liquids and solids.
5. Be sure to record the level of sediment build-up on the floor of the vault, in the forebay, and on top of the cartridges. If flow is occurring, note the flow of water per drainage pipe. Record all observations. Digital pictures are valuable for historical documentation.
6. Close and fasten the access portals.
7. Remove safety equipment.
8. If appropriate, make notes about the local drainage area relative to ongoing construction, erosion problems, or high loading of other materials to the system.
9. Discuss conditions that suggest maintenance and make decision as to whether or not maintenance is needed.

## Maintenance Decision Tree

The need for maintenance is typically based on results of the inspection. The following Maintenance Decision Tree should be used as a general guide. (Other factors, such as Regulatory Requirements, may need to be considered)

1. Sediment loading on the vault floor.
  - a. If  $>4$ " of accumulated sediment, maintenance is required.
2. Sediment loading on top of the cartridge.
  - a. If  $>1/4$ " of accumulation, maintenance is required.
3. Submerged cartridges.
  - a. If  $>4$ " of static water above cartridge bottom for more than 24 hours after end of rain event, maintenance is required. (Catch basins have standing water in the cartridge bay.)
4. Plugged media.
  - a. If pore space between media granules is absent, maintenance is required.
5. Bypass condition.
  - a. If inspection is conducted during an average rain fall event and StormFilter remains in bypass condition (water over the internal outlet baffle wall or submerged cartridges), maintenance is required.
6. Hazardous material release.
  - a. If hazardous material release (automotive fluids or other) is reported, maintenance is required.
7. Pronounced scum line.
  - a. If pronounced scum line (say  $\geq 1/4$ " thick) is present above top cap, maintenance is required.



## Maintenance

Depending on the configuration of the particular system, maintenance personnel will be required to enter the vault to perform the maintenance.

**Important:** If vault entry is required, OSHA rules for confined space entry must be followed.

Filter cartridge replacement should occur during dry weather. It may be necessary to plug the filter inlet pipe if base flows is occurring.

Replacement cartridges can be delivered to the site or customers facility. Information concerning how to obtain the replacement cartridges is available from Contech Engineered Solutions.

**Warning:** In the case of a spill, the maintenance personnel should abort maintenance activities until the proper guidance is obtained. Notify the local hazard control agency and Contech Engineered Solutions immediately.

To conduct cartridge replacement and sediment removal maintenance:

1. If applicable, set up safety equipment to protect maintenance personnel and pedestrians from site hazards.
2. Visually inspect the external condition of the unit and take notes concerning defects/problems.
3. Open the doors (access portals) to the vault and allow the system to vent.
4. Without entering the vault, give the inside of the unit, including components, a general condition inspection.
5. Make notes about the external and internal condition of the vault. Give particular attention to recording the level of sediment build-up on the floor of the vault, in the forebay, and on top of the internal components.
6. Using appropriate equipment offload the replacement cartridges (up to 150 lbs. each) and set aside.
7. Remove used cartridges from the vault using one of the following methods:

### Method 1:

- A. This activity will require that maintenance personnel enter the vault to remove the cartridges from the under drain manifold and place them under the vault opening for lifting (removal). Disconnect each filter cartridge from the underdrain connector by rotating counterclockwise 1/4 of a turn. Roll the loose cartridge, on edge, to a convenient spot beneath the vault access.

Using appropriate hoisting equipment, attach a cable from the boom, crane, or tripod to the loose cartridge. Contact Contech Engineered Solutions for suggested attachment devices.

- B. Remove the used cartridges (up to 250 lbs. each) from the vault.



**Important:** Care must be used to avoid damaging the cartridges during removal and installation. The cost of repairing components damaged during maintenance will be the responsibility of the owner.

- C. Set the used cartridge aside or load onto the hauling truck.
- D. Continue steps a through c until all cartridges have been removed.

### Method 2:

- A. This activity will require that maintenance personnel enter the vault to remove the cartridges from the under drain manifold and place them under the vault opening for lifting (removal). Disconnect each filter cartridge from the underdrain connector by rotating counterclockwise 1/4 of a turn. Roll the loose cartridge, on edge, to a convenient spot beneath the vault access.
- B. Unscrew the cartridge cap.
- C. Remove the cartridge hood and float.
- D. At location under structure access, tip the cartridge on its side.
- E. Empty the cartridge onto the vault floor. Reassemble the empty cartridge.
- F. Set the empty, used cartridge aside or load onto the hauling truck.
- G. Continue steps a through e until all cartridges have been removed.

8. Remove accumulated sediment from the floor of the vault and from the forebay. This can most effectively be accomplished by use of a vacuum truck.
9. Once the sediments are removed, assess the condition of the vault and the condition of the connectors.
10. Using the vacuum truck boom, crane, or tripod, lower and install the new cartridges. Once again, take care not to damage connections.
11. Close and fasten the door.
12. Remove safety equipment.
13. Finally, dispose of the accumulated materials in accordance with applicable regulations. Make arrangements to return the used **empty** cartridges to Contech Engineered Solutions.

### Related Maintenance Activities - Performed on an as-needed basis

StormFilter units are often just one of many structures in a more comprehensive stormwater drainage and treatment system.

In order for maintenance of the StormFilter to be successful, it is imperative that all other components be properly maintained. The maintenance/repair of upstream facilities should be carried out prior to StormFilter maintenance activities.

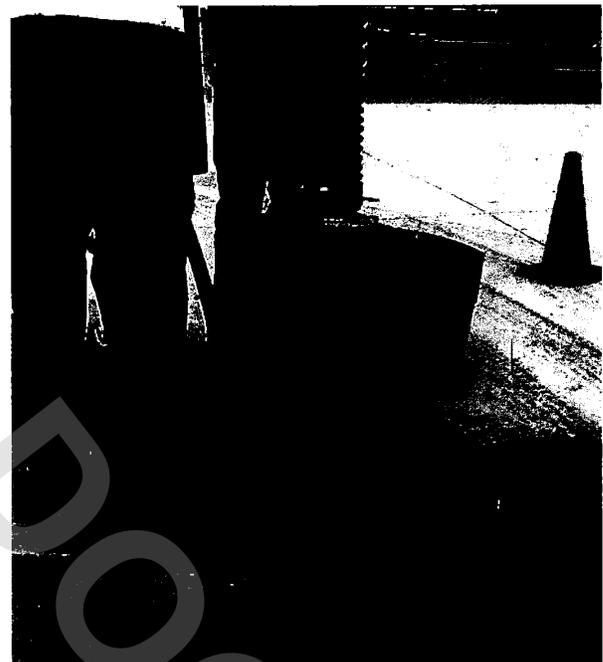
In addition to considering upstream facilities, it is also important to correct any problems identified in the drainage area. Drainage area concerns may include: erosion problems, heavy oil loading, and discharges of inappropriate materials.



### Material Disposal

The accumulated sediment found in stormwater treatment and conveyance systems must be handled and disposed of in accordance with regulatory protocols. It is possible for sediments to contain measurable concentrations of heavy metals and organic chemicals (such as pesticides and petroleum products). Areas with the greatest potential for high pollutant loading include industrial areas and heavily traveled roads.

Sediments and water must be disposed of in accordance with all applicable waste disposal regulations. When scheduling maintenance, consideration must be made for the disposal of solid and liquid wastes. This typically requires coordination with a local landfill for solid waste disposal. For liquid waste disposal a number of options are available including a municipal vacuum truck decant facility, local waste water treatment plant or on-site treatment and discharge.



# Inspection Report

Date: \_\_\_\_\_ Personnel: \_\_\_\_\_

Location: \_\_\_\_\_ System Size: \_\_\_\_\_

System Type: Vault  Cast-In-Place  Linear Catch Basin  Manhole  Other

Sediment Thickness in Forebay: \_\_\_\_\_ Date: \_\_\_\_\_

Sediment Depth on Vault Floor: \_\_\_\_\_

Structural Damage: \_\_\_\_\_

Estimated Flow from Drainage Pipes (if available): \_\_\_\_\_

Cartridges Submerged: Yes  No  Depth of Standing Water: \_\_\_\_\_

StormFilter Maintenance Activities (check off if done and give description)

Trash and Debris Removal: \_\_\_\_\_

Minor Structural Repairs: \_\_\_\_\_

Drainage Area Report \_\_\_\_\_

Excessive Oil Loading: Yes  No  Source: \_\_\_\_\_

Sediment Accumulation on Pavement: Yes  No  Source: \_\_\_\_\_

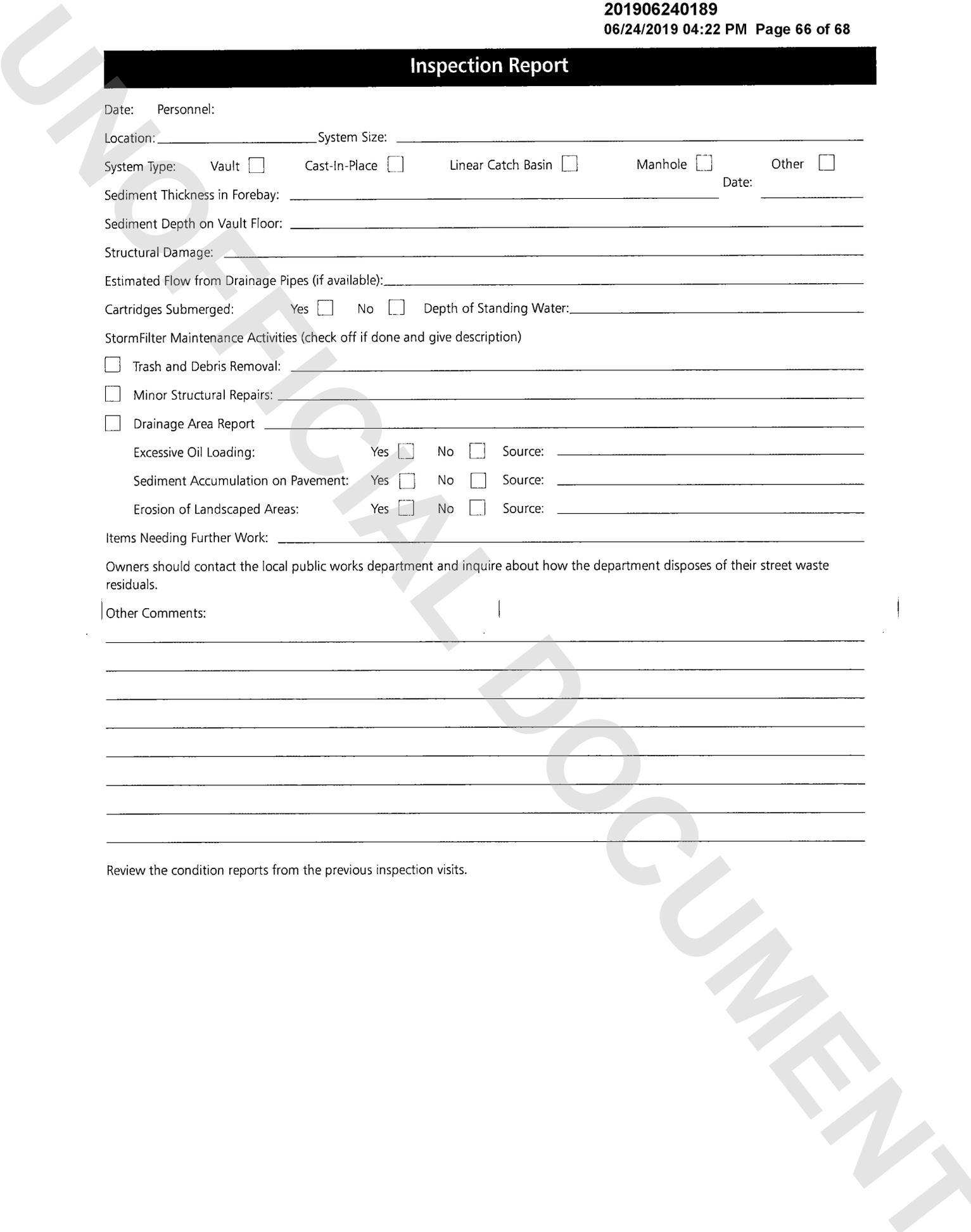
Erosion of Landscaped Areas: Yes  No  Source: \_\_\_\_\_

Items Needing Further Work: \_\_\_\_\_

Owners should contact the local public works department and inquire about how the department disposes of their street waste residuals.

Other Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Review the condition reports from the previous inspection visits.



**StormFilter Maintenance Report**

Date: \_\_\_\_\_ Personnel: \_\_\_\_\_

Location: \_\_\_\_\_ System Size: \_\_\_\_\_

System Type: Vault  Cast-In-Place  Linear Catch Basin  Manhole  Other

List Safety Procedures and Equipment Used: \_\_\_\_\_

**System Observations**

Months in Service: \_\_\_\_\_

Oil in Forebay (if present): Yes  No

Sediment Depth in Forebay (if present): \_\_\_\_\_

Sediment Depth on Vault Floor: \_\_\_\_\_

Structural Damage: \_\_\_\_\_

**Drainage Area Report**

Excessive Oil Loading: Yes  No  Source: \_\_\_\_\_

Sediment Accumulation on Pavement: Yes  No  Source: \_\_\_\_\_

Erosion of Landscaped Areas: Yes  No  Source: \_\_\_\_\_

**StormFilter Cartridge Replacement Maintenance Activities**

Remove Trash and Debris: Yes  No  Details: \_\_\_\_\_

Replace Cartridges: Yes  No  Details: \_\_\_\_\_

Sediment Removed: Yes  No  Details: \_\_\_\_\_

Quantity of Sediment Removed (estimate?): \_\_\_\_\_

Minor Structural Repairs: Yes  No  Details: \_\_\_\_\_

Residuals (debris, sediment) Disposal Methods: \_\_\_\_\_

Notes:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



©2016 CONTECH ENGINEERED SOLUTIONS LLC.

800-338-1122

[www.ContechES.com](http://www.ContechES.com)

All Rights Reserved. Printed in the USA.

Contech Engineered Solutions LLC provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, sanitary sewer, stormwater and earth stabilization products. For information on other Contech division offerings, visit [contech-cpi.com](http://contech-cpi.com) or call 800.338.1122.

#### Support

- Drawings and specifications are available at [www.conteches.com](http://www.conteches.com).
- Site-specific design support is available from our engineers.

NOTHING IN THIS CATALOG SHOULD BE CONSTRUED AS AN EXPRESSED WARRANTY OR AN IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE . SEE THE CONTECH STANDARD CONDITIONS OF SALE (VIEWABLE AT [WWW.CONTECHES.COM/COS](http://WWW.CONTECHES.COM/COS)) FOR MORE INFORMATION .