JOINT CITY OF SPRINGFIELD & LANE COUNTY PLANNING COMMISSION AGENDA

DATE: Tuesday, September 5th, 2023

TIME: 7 PM Public Hearing

LOCATION: Virtually via ZOOM & In-Person at:

***NO RSVP REQUIRED** Conference Room 616, Development Center (SE Quad), Springfield City Hall, 225 5th St, Springfield, OR 97477.

***RSVP REQUIRED** Goodpasture Room, Lane County Customer Service Center 3050 N Delta HWY, Eugene, OR 97408.

The Commissioners will meet using virtual meeting technology. No RSVP is required to attend in person at the Conference Room 616, Development Center (SE Quad), Springfield City Hall. There will be limited capacity in the Goodpasture Room for those without internet access or in need of special accommodations who wish to attend in-person. To attend in person at the Goodpasture Room, please RSVP by calling David Ruiz-Maya at 541-682-6768. Lane County and the City of Springfield comply with state and federal laws and regulations relating to discrimination, including the Americans with Disabilities Act of 1990 (ADA).

7:00 PM JOINT PUBLIC HEARING

Joint Public Hearing

- Stormwater Post Construction Requirements

Springfield Staff: Haley Campbell

Lane County Staff: Rachel Serslev

7:45 PM (APPROX) INFORMATION UPDATE FROM STAFF

- Update on the Minor Code Amendments

Springfield Staff: Haley Campbell / Mark Rust

Lane County Staff: Rachel Serslev

Virtual Meeting Details

Join from a PC, Mac, iPad, iPhone or Android device via ZOOM:

Please click this URL to join:
https://us06web.zoom.us/j/4107418327?pwd=U1lPeWJxM0gxVnNDT1pPbFl0b3pTQT09

Passcode:
5417263653

Join by Phone

Dial (US):
+1 971 247 1195
+1 877 853 5247 toll free

Meeting ID:
410 741 8327

Lane County Planning Commission Members: Chair: Eliza Kashinsky, Vice Chair: Jeff Choate, Stephen Dignam, Bruce Hadley, Charlcie Kaylor, Markus Lay, Jonnie Peacock, Stephen Snider, and Christian Wihtol

City of Springfield Planning Commission Members: Chair Matt Salazar, Vice Chair Isaac Rhoads-Dey, Steven Schmunk, Andrew Buck, Seth Thompson, Alan Stout

Public Hearing Order of Presentation

1 – Explanation of procedural requirements

2 – Open the hearing

3 – Staff report

4 – Testimony from interested parties

5 – Clarifying questions from Commissioners

6 – Close or continue the hearing

7 – If the hearing is closed, close or hold open the Planning Commission record

8 – Deliberations

Note: Any public comments submitted after the Planning Commissions close the record will be provided to the elected officials as part of their joint public hearing later this year.

AGENDA ITEM SUMMARY		
	Meeting Date:	9/5/2023
	Meeting Type:	Regular Meeting
	Staff	Haley Campbell
	Contact/Dept.:	DPW
	Staff Phone No:	541-736-3647
	Estimated Time:	30 minutes
SPRINGFIELD PLANNING COMMISSION	**Council Goals:**	Mandate

ITEM TITLE:	STORMWATER POST-CONSTRUCTION REQUIREMENTS CODE UPDATES
ACTION REQUESTED:	Continue the public hearing on the proposed changes to the Springfield Development Code (SDC) Sections 4.3.110 Stormwater Management, various sections that encourage the use of stormwater facilities and Section 6.1.100 Definitions. After deliberations, make a recommendation to the City Council and Lane County Board of Commissioners who are the approval authorities for this decision.
ISSUE STATEMENT:	The Oregon Department of Environmental Quality issued an MS4 permit to the City of Springfield to regulate pollution from stormwater released to surface water, including the McKenzie and Willamette Rivers. As part of the permit, the City is required to review and update post-construction stormwater management requirements to include a site performance standard and alternative, treatment standard, review and update requirements for large development and redevelopment sites, and review and update code and remove barriers to low impact development and green infrastructure (i.e. swales, rain gardens, previous pavements, etc.). The City must adopt an updated Stormwater development ordinance to ensure ongoing compliance with the MS4 permit standards. Updating Springfield's Development Code to align with the permit requirements will allow the City to continue to participate in the MS4 permit program.

ATTACHMENTS (changes made to documents since Aug. 1 hearing are highlighted in yellow in the documents and below)**:**

ATT1 – Draft Planning Commission Order and Recommendation
- Exhibit A Staff Report
- Exhibit B Legislative Version of Code Amendments
- Exhibit C Clean Version of Appendices

ATT2 – Explanation of Appendices to the Development Code

ATT3 – Key Changes to the Development Code

ATT4 – Draft Amendments to the EDSPM
- Exhibit A Legislative Version of EDSPM Amendments
- Exhibit B Legislative Version of Table of Contents
- Exhibit C Clean Version of Chapter 4 Appendices

ATT5 – Explanation of Appendices to Chapter 4 of the EDSPM

ATT6 – Presentation Slides

DISCUSSION:

The proposed amendments are being reviewed as a Type 4 Legislative Amendment to the Development Code. The Planning Commission continued the August 1, 2023 public hearing until September 5, 2023 to allow for Ballot Measure 56 Notice.

Since the August 1, 2023 hearing, Lane County provided feedback to remove the underlined clause in SDC 4.3.110(B)(1): "Development that creates or replaces 5,000 square feet or more of impervious surface area and discharges to the storm system...". The phrase "discharges to the storm system" is intended to include sites that drain to the City's MS4 permit area. However, the City's MS4 permit area includes the entire Springfield UGB and so this phrase is unnecessary. It also creates confusion related to

sites that choose to meet the site performance standard by infiltrating the first 1.4" of rainfall in 24 hours; these sites will still discharge to the storm system during very large storm events and are still subject to SDC 4.3.110.Therefore, to avoid confusion and remove unnecessary language, City and County staff recommend removing this clause. See ATT 1, Exhibit B Legislative Version of the Code Amendments.

The Commission is expected to close the public hearing and written record and then deliberate. The Commissions will then make recommendations to the City Council and Lane County Board of Commissioners. The Springfield City Council and Lane County Board of Commissioners will hold a joint work session and joint public hearing to review the Planning Commissions' recommended amendments on November 6, 2023.

BEFORE THE PLANNING COMMISSION OF SPRINGFIELD, OREGON
ORDER AND RECOMMENDATION FOR:

AMENDMENTS TO THE SPRINGFIELD DEVELOPMENT CODE (SDC)	**]**	
SECTION 4.3.110 STORMWATER MANAGEMENT, VARIOUS	**]**	**811-23-000124-TYP4**
SECTIONS INVOLVING THE USE OF STORMWATER FACILITIES	**]**	
SDC 6.1.100 DEFINITIONS	**]**	

NATURE OF THE PROPOSAL
Request that the Springfield Planning Commission forward a recommendation of approval to the Springfield City Council regarding amendments to the following sections of the Springfield Development Code in order to comply with minimum standards required to continue participation in the Municipal Separate Storm Sewer System (MS4) Permit program:

Chapter 3 Land Use Districts:
- Various Sections that Involve the Use of Stormwater Facilities

Chapter 4 Development Standards:
- Section 4.3.110 Stormwater Management
- Various Sections that Involve the Use of Stormwater Facilities

Chapter 5 The Development Review Process and Applications
- Various Sections that Involve the Use of Stormwater Facilities

Chapter 6 Definitions
- Section 6.1.110 Meaning of Specific Words and Terms

Addition of Appendices
- The Creation of Appendices B through H

Timely and sufficient notice of the public hearing has been provided pursuant to ORS 227.186 and Springfield Development Code Section 5.1.615. Notice was sent to the Department of Land Conservation and Development on June 26, 2023, not less than 35 days prior to the first evidentiary hearing in compliance with OAR 660-018-0020.

On August 1, 2023, the Springfield Planning Commission held a duly noticed public hearing on the proposed text amendments. The Planning Commission continued the August 1, 2023 public hearing until September 5, 2023. The public hearing was conducted in accordance with Springfield Development Code 5.1.610. After review of the staff report, evidence in the record, and public testimony, the Planning Commission determined that the code amendments meet the approval criteria.

CONCLUSION
On the basis of the Staff Report and Findings of Fact (Exhibit A) and evidence in the record, the proposed code amendments and new appendices (Exhibits B and C) meet the approval criteria of Springfield Development Code Section 5.6.115.

ORDER/RECOMMENDATION

It is ORDERED by the Springfield Planning Commission that a recommendation for APPROVAL of 811-23-000124-TYP4 be forwarded to the Springfield City Council for consideration at an upcoming public hearing.

_____ _____

Planning Commission Chairperson Date

ATTEST
AYES:

NOES:

ABSENT:
ABSTAIN:

SPRINGFIELD PLANNING COMMISSION
STAFF REPORT

TYPE IV – LEGISLATIVE AMENDMENT TO THE SPRINGFIELD DEVELOPMENT CODE

CASE NUMBER: 811-23-000124-TYP4
HEARING DATE: August 1, 2023, continued to September 5, 2023
REPORT DATE: July 25, 2023
PROJECT NAME: Stormwater Post-Construction Requirements Code Amendments
AFFECTED AREA: All properties within the City of Springfield urban growth boundary

I. NATURE OF THE REQUEST

The City of Springfield seeks approval of amendments to the Springfield Development Code for consistency with the City's Municipal Separate Storm Sewer System (MS4) Permit. The purpose of the Post-Construction Requirements Update project is to modify the Springfield Development Code to comply with the Oregon Department Environmental Quality's (DEQ) requirements of the City. Updating Springfield's Development Code to align with current state requirements will allow the City to continue to participate in the MS4 permit program.

II. BACKGROUND

In accordance with the 1972 Federal Clean Water Act, the Oregon Department of Environmental Quality (DEQ) issued a permit to the City of Springfield called a Municipal Separate Storm Sewer System (MS4) permit. The permit regulates pollution from stormwater released to surface water, including the McKenzie and Willamette Rivers. The current MS4 permit characterizes Springfield's stormwater drainage system, establishes goals, policies and implementation actions; and measures, reports, and adaptively manages the City's water resources and stormwater runoff. The permit and Springfield Development Code implement and enforce post-construction site runoff controls within the Springfield urban growth boundary, including unannexed areas through an intergovernmental agreement with Lane County. The post-construction site runoff control program reduces discharge of pollutants and addresses stormwater runoff from new development and redevelopment.

Regulations for post-construction stormwater runoff are contained in the Springfield Development Code and the Engineering Design Standards and Procedures Manual (or EDSPM). Amendments to the Springfield Development Code are subject to a land use approval process that includes public hearings, recommendations from the Planning Commissions, and final co-adoption by the elected officials. The amendments to the EDSPM do not require a land use process and will be adopted directly by the City Council without a Planning Commission recommendation. Information from the City's EDSPM will be shared at the meeting as portions of the manual are proposed for adoption into the Code.

The purpose of the MS4 Post-Construction Runoff Amendment Project is to update the Springfield Development Code to comply with Oregon DEQ's requirements of the City, including requirements to regulate post-construction site runoff and minimize barriers to low impact development and green infrastructure under the City's MS4 Permit. These amendments would allow and encourage the use of stormwater treatment facilities including swales, rain gardens,

and pervious pavements and strengthen requirements that address stormwater quality issues and improve the quality of water in the City's drinking water protection areas.

The project objectives are to:

1) Review and update enforceable post-construction stormwater management requirements in ordinance or other regulatory mechanism that includes a site performance standard and alternative treatment standard.
2) Review and update post-construction requirements for development and redevelopment, especially for project sites that create or replace 5,000 square feet or more of impervious area.
3) Review development code and remove barriers to low impact development and green infrastructure.

III. SITE INFORMATION

The amendments are not site-specific, they apply to a large area and a large number of properties. Affected properties are those with project sites that discharge stormwater to the storm sewer system that create or replace 5,000 square feet or more of impervious surface area or for development projects that disturb one or more acres of land. Runoff from these developments must be captured by structural stormwater controls which are physically designed, installed, and maintained facilities that prevent or reduce the discharge of pollutants to minimize the impacts on waterbodies.

IV. PROCEDURAL REQUIREMENTS AND CITIZEN INVOLVEMENT

Under SDC 5.6.110, amendments of the Development Code text are reviewed under a Type 4 procedure as a legislative action. Type 4 procedures, as defined in SDC 5.1.600, require a review and recommendation by the Planning Commission and adoption of ordinance by City Council.

The code updates include changes that apply within the urbanizable areas that are between the City limits and the Springfield urban growth boundary. Therefore, the code updates are subject to provisions of the City of Springfield and Lane County's urban transition agreement, which requires the City and County to jointly develop land use regulations to be applied to the urbanizable portion of the Springfield UGB. The Springfield Planning Commission and Lane County Planning Commission held a joint public hearing for the purpose of developing their recommendations to City Council and Board of Commissioners, respectively. The City Council and Board of County Commissioners will hold a joint public hearing to co-adopt the regulations applicable to the urbanizable area. The Director for the City of Springfield initiated these development code amendments as is allowed under SDC 5.6.105(B).

In accordance with the City of Springfield Citizen Involvement Program, the Committee for Citizen Involvement (CCI) reviewed and approved a Citizen Involvement Strategy for this proposal on April 18, 2023. Per this strategy and other requirements the City has completed the following:

- In April 2023, created a project page on Springfield Oregon Speaks with links to the Development Code Updates webpage on the City of Springfield website. The webpages provided opportunities for the public to view key messages or relevant resources and factsheets and collect input from the public.

- Held two public workshops to convey the main points of the project to development professionals, on June 13 and June 15, 2023.
- Emailed notice of the proposed amendments to stakeholder groups per the Citizen Involvement Strategy on June 23, 2023.
- As required by SDC 5.1.615(E), provided agency referrals to the Development Review Committee regarding the proposed amendments via email on June 23, 2021.
- Submitted notice of the proposed amendments to the Department of Land Conservation and Development (DLCD) on June 26, 2023, 35 days in advance of the first evidentiary hearing as required by ORS 197.610(1) and OAR 660-018-0020.
- Mailed notice of the Planning Commission Joint Hearing on July 6, 2023 to development professionals (developers, builders, landscape architects, engineers, and realtors, including the Springfield Board of Realtors and Lane County Home Builders Association) and environmental groups who expressed an interest in being notified of future code amendments (following the 2022 Development Code Update Project).
- Emailed notice of the proposed amendments to stakeholder groups per the Citizen Involvement Strategy on June 23, 2023.
- As required by SDC 5.1.615(E), provided agency referrals to the Development Review Committee regarding the proposed amendments via email on June 23, 2021.
- Published notice of the proposed amendments in The Chronicle on July 6, 2023 as required by SDC 5.1.615.
- Posted notice of the proposed amendments and the dates of the public hearings on the City of Springfield website which routinely posts public hearing notices.
- An amendment to the proposed code would prohibit stormwater infiltration and affect property setbacks, which triggered “Ballot Measure 56” notice under ORS 227.186. As this code revision was not initially included in the draft amendments staff did not provide said notice prior to the August 1 public hearing. Staff mailed notice pursuant to ORS 227.186 on August 11, at least 21 days prior to the continued hearing date of September 5, 2023.

As of the date of this staff report, there were inquiries about the proposed code language. Staff received one written comment from Staff at the Long Tom Watershed Council in response to the information in the notices.

- *There are a number of reasons why it makes sense to align with the City of Eugene's stormwater manual, but Eugene's manual is nearly a decade old and does not reflect current best practices. Eugene is aware of this and is in the process of updating their manual to address the latest science, inconstancies, and other shortfalls. As such, it does not seem to be in Springfield's best interest to adopt a manual that is known to be out of date, especially at it relates to facility design. Known best practices are to have a functional sediment drop at all inlets, to have no fabric, and to limit gravel galleries and associated underdrains to the lowest third of the facility. Good examples of typical details that incorporate these concepts and more can be found in Portland's stormwater manual. Depth of soil, soil types, and how newly imported soil interfaces with existing soils should also be updated to best practices. Typically, new soil should be tilled to a min depth of 6" with a min. of 18" of new stormwater specific soil added. This soil should be high in organics and incorporate biochar at a minimum of 4% by volume to best manage the urban complex of pollutants and to maximize detention and infiltration. I am happy to*

discuss these recommendations further, and point you to scientific articles that support these recommendations if that is desired. – Sarah Whitney

Staff Response: Staff appreciate the Long Tom Watershed Council for providing feedback on the Stormwater Post-Construction Requirements Update and acknowledge that some of the proposed practices are pragmatic, including changing the standard facility design details or requirements of some items (the depth of soil and soil types). While some of the proposed details in the Eugene manual may be out of date, Springfield is aligning with the currently adopted regional standards, which are well established and are what can reasonably be built by most developers. Sourcing exotic materials like biochar may be unrealistic in many Low Impact Development or vegetated structural stormwater control facilities. For instance, biochars have been reported to improve plant health through providing improved water, nutrient retention, drainage and aeration; but they can also produce high pH which can reduce soil acidity levels and negatively impact soil microbes causing a detrimental effect to certain plants. Furthermore, many studies refer to relatively limited experimental assessments and report on quite specific plant, soil, and environmental interactions. Therefore, more research is recommended before including biochars in a typical stormwater facility design. Amendments to the Springfield Development Code include the addition of Appendix D Typical Stormwater Facility Details which was brought over from the Springfield Engineering Manual (EDSPM). One such amendment, is the requirement of a minimum 24-inch growing medium with at least 50% organic material in the Drinking Water Protection 0-2 Year Time of Travel Zone, which can accomplish nearly the same soil composition traits as the installation of biochars. Finally, Staff will consider amending these standards when regional stormwater codes at the City of Eugene and Lane County are amended and codified.

For this request, the Springfield and Lane County Planning Commission shall make a recommendations respectively to the Springfield City Council and Lane County Board of Commissioners which are the Approval Authorities for the final local decision. Per the Urban Transition Intergovernmental Agreement and SDC 5.1.625, development code amendments which impact areas outside the City limits must be co-adopted by the Lane County Board of Commissioners in order to apply to urbanizable areas within the Springfield UGB. Decisions of the Springfield City Council and Lane County Board of Commissioners may be appealed to the Oregon Land Use Board of Appeals within 21 calendar days of the date the decision becomes final as specified in ORS 197.830 (SDC 5.1.630(F)).

V. APPROVAL CRITERIA & FINDINGS

The request is subject to approval criteria in SDC 5.6.115, which covers adoption or amendment of refinement plans, plan districts and the development code. The following approval criteria are listed under SDC 5.6.115:

A. In reaching a decision on the adoption or amendment of refinement plans and this Code's text, the City Council shall adopt findings that demonstrate conformance to the following:

1. The Metro Plan and Springfield Comprehensive Plan;
2. Applicable State statutes; and
3. Applicable State-wide Planning Goals and Administrative Rules.

Findings showing that the proposed amendments to the development code meet the applicable criteria of approval appear in regular text below. Direct citations or summaries of criteria appear in *italics* and precede or are contained within the relevant findings.

Conformance with the Metro Plan and Springfield Comprehensive Plan

The adopted Metro Plan and Springfield Comprehensive Plan are the acknowledged long-range plans that provide the board framework for land use planning within the City of Springfield. The policies of the Springfield Comprehensive Plan – Residential Land Use and Housing Element are intended to refine and update (as opposed to replace) the goals, objectives and policies of the Metro Plan's Residential Land Use and Housing Element. The Springfield Comprehensive Plan – Economic and Urbanization Elements replace the applicable sections of the Metro Plan pertaining to employment lands and urbanizable lands.

The Metro Plan and Springfield Comprehensive Plan contain topics or "elements". Each element contains a goal and policies that will guide Springfield's growth and development through the 2010-2030 planning period.

The Stormwater Post-Construction Requirements Update project is consistent with the following Metro Plan policies:

Environmental Resources Element

Air, Water and Land Resources Quality (Goal 6)

C.25 Springfield, Lane County, and Eugene shall consider downstream impacts when planning for urbanization, flood control, urban storm runoff, recreation, and water quality along the Willamette and McKenzie Rivers.

Finding 1: The amended standards in SDC 4.3.110 Stormwater Management require the City of Springfield to review all permit applications to determine if development is proposed to:

1) Create or replace 5,000 square feet or more of impervious surface area and discharge to the storm system;
2) Disturb one or more acres of land within the development area; and
3) Generate peak flows in excess of 0.5 cubic feet per second within the development area.

If an application does meet these standards, then the City requires developers to incorporate one or more structural stormwater controls.

Finding 2: Structural stormwater controls are physically designed, installed, and maintained to prevent or reduce the discharge of pollutants in stormwater to minimize the impacts of stormwater on water bodies. Examples of structural stormwater controls or Best Management Practices (BMPs) include: (1) storage practices such as wet ponds and extended detention outlet structures; (2) filtration practices such as grassed swales, sand filters and filter strips; and (3) filtration practices such as filtration basins and infiltration trenches.

Finding 3: The standards require that applicants capture the first one and four tenths

inches (1.4") of rainfall from each storm event and route them to one or more structural stormwater controls (referred to as the Site Performance Standard) or if that standard cannot be met, rainfall must be retained onsite to the maximum extent practicable and the remainder of the runoff up to 1.4" must be treated to remove at least 80% of Total Suspended Solids (TSS) (referred to as the Treatment Standard).

Finding 4: Furthermore, per the amended code, the City will require applicants to submit a Stormwater Study to describe how the proposed stormwater management approach targets the natural surface or predevelopment hydrologic function of the area through the installation of a structural stormwater control. It must also address the facilities impact on offsite flows, drainage areas, environmentally sensitive areas, flood elevations or flood ways, and their proximity to natural resource areas. By requiring a stormwater study for all structural stormwater controls that are installed to offset the impacts of impervious surface development, the City of Springfield considers the downstream impact of urbanization, flood control, stormwater runoff, recreation, and water quality along the McKenzie and Willamette Rivers.

C.26 Local governments shall continue to monitor, to plan for, and to enforce applicable air and water quality standards and shall cooperate in meeting applicable federal, state, and local air and water quality standards.

Finding 5: These amendments are required for the City to comply with its MS4 Permit, pursuant to Oregon Revised Statute (ORS) 468B. 050 and Section 402 of the Federal Clean Water Act. This Metro Plan policy is further addressed in response to Statewide Planning Goal 6. See Finding 30 below.

Natural Hazards (Goal 7)

C.32 Local governments shall require site-specific soil surveys and geologic studies where potential problems exist. When problems are identified, local governments shall require special design considerations and construction measures be taken to offset the soil and geologic constraints present, to protect life and property, public investments, and environmentally-sensitive areas.

Finding 6: The City's MS4 permit requires the City to require structural stormwater controls for new development and redevelopment project that create or replace 5,000 square feet or more of impervious surface area or disturb one or more acres of land. As discussed above, applicants must capture the first one and four tenths inches (1.4") of rainfall from each storm event and route them to one or more structural stormwater controls. If that standard cannot be met due to technical infeasibility or site constraints, applicants can apply for review under the alternative Treatment Standard. Under the Treatment Standard, rainfall must be retained onsite to the maximum extent practicable and the remainder of the 1.4" of runoff must remove at least 80% of Total Suspended Solids from any storm event. The alternative Treatment Standard provides "special design consideration" for sites that may not be able to capture the Site Performance Standard of 1.4" rainfall due to: shallow bedrock, high groundwater, protection of groundwater from contamination, soil instability as documented by geotechnical analysis, land use that is inconsistent with the capture and infiltration of stormwater, the known presence of soil contamination, or constraints arising from the Drinking Water Protection Overlay District. Therefore, where an application proposes development on a property with site

constraints, an applicant must take measures to offset the soil and geologic constraints present to protect life, property, public investments, and environmentally-sensitive areas.

Environmental Design Element

E.2 Natural vegetation, natural water features, and drainage-ways shall be protected and retained to the maximum extent practical. Landscaping shall be utilized to enhance those natural features. This policy does not preclude increasing their conveyance capacity in an environmentally responsible manner.

Finding 7: The development code amendments have clear allowances for the use of vegetated stormwater treatment. Structural stormwater controls should primarily include vegetation with mechanical treatment used as a last resort. The vegetation may also count as part of the required site landscaping. Therefore, the use of vegetated structural stormwater controls or Low Impact Development may form the basis of natural vegetation areas or in required setbacks along natural water features and will capture and retain runoff before they impact drainage-ways to protect them to the maximum extent practical.

E.3 The planting of street trees shall be strongly encouraged, especially for all new developments and redeveloping areas (where feasible) and new streets and reconstruction of major arterials within the UGB.

Finding 8: The amendments are in conformance with the above stated policy as the City of Springfield maintains a list of approved street trees. The City's plant and tree lists have been updated and reformatted to be clearer and easier to use. During draft review, staff contacted local arborists and landscape architects to receive feedback on the City's Facility Plant and Street Tree lists. The lists have been amended to include criteria for approval of species not currently on the list and to be consistent with Eugene's 2014 Stormwater Management Manual Facility Planting Design. Non-native invasive species are not allowed in stormwater facilities and only natives are allowed in stormwater facilities within Natural Resource Protection Area setbacks. A minimum of three unique species are required per facility for species diversity.

E.4 Public and private facilities shall be designed and located in a manner that preserves and enhances desirable features of local and neighborhood areas and promotes their sense of identity.

Finding 9: The proposed amendments require developers to design structural stormwater control facilities based on their ability to prevent or reduce the discharge of pollutants in stormwater on waterbodies. Examples of structural stormwater controls include: wet ponds and extended detention outlet structures, grassed swales, sand filters and filter strips, and filtration basins and infiltration trenches. By prioritizing management practices that mimic natural surface or predevelopment hydrological functions and the use of Low Impact Development approaches or green infrastructure, the City is actively working to preserve and enhance local neighborhood areas and promote their sense of identity through the installation of these facilities.

The Stormwater Post-Construction Requirements Update project is consistent with the following Public Facilities and Services Element policies:

Services to Development Within the Urban Growth Boundary: Stormwater

G.13 Improve surface and ground water quality and quantity in the metropolitan area by developing regulations or instituting programs for stormwater to:

- *a. Increase public awareness of techniques and practices private individuals can employ to help correct water quality and quantity problems;*
- *b. Improve management of industrial and commercial operations to reduce negative water quality and quantity impacts;*
- *c. Regulate site planning for new development and construction to better manage pre- and post-construction storm runoff, including erosion, velocity, pollutant loading, and drainage;*
- *d. Increase storage and retention and natural filtration of storm runoff to lower and delay peak storm flows to settle out pollutants prior to discharge into waterways;*
- *e. Require on-site controls and development standards, as practical, to reduce off-site impacts from stormwater runoff;*
- *f. Use natural and simple mechanical treatment systems to provide treatment for potentially contaminated runoff waters;*
- *g. Reduce street-related water quality and quantity problems;*
- *h. Regulate use and require containment and/or pretreatment of toxic substances;*
- *i. Include containment measures in site review standards to minimize the effects of chemical and petroleum spills; and*
- *j. Consider impacts to ground water quality in the design and location of dry wells.*

Finding 10: Stormwater management in Springfield is regulated by multiple programs, ordinances, and code provisions. Three divisions provide support to the review of stormwater plans and permits. Long-term stormwater infrastructure planning and development review is managed by the Community Development Division, stormwater maintenance and enforcement on private development sites and outreach to the public and property owners are handled by the Environmental Services Division, and stormwater maintenance of public facilities is the responsibility of the Operations Division. The Environmental Services Division has a stormwater public awareness program where they inform residents, businesses, and industries about the importance of our Drinking Water Protection program and water recreational resources.

Finding 11: The Stormwater Post-Construction Requirements that are included in the code amendments will improve management of industrial and commercial operations by requiring structural stormwater controls for any development or redevelopment that disturbs more than 5,000 square feet of impervious surface or one or more acres of land and regulates site planning for new development, redevelopment, and construction to better manage post-construction storm runoff in compliance with the MS4 permit. Portions of the Engineering Design Standards and Procedures Manual (or EDSPM) that apply to private development (such as erosion, velocity, pollutant loading, and drainage requirements) will be added to the development code. Construction specifications and design standards that only apply to public infrastructure approvals or that are non-mandatory guidelines will remain in the EDSPM.

Finding 12: The new code standards will: (1) facilitate and encourage the incorporation of site-specific management practices that mimic natural surface or predevelopment hydrological functions, optimizing on-site retention; (2) result in reduced site specific post-construction stormwater runoff, volume, duration and rates of discharge to the storm sewer system, thereby

minimizing water quality impacts from impervious surface. By increasing the storage, retention, and natural filtration of stormwater runoff to lower and delay peak storm flows, the stormwater facilities settle out pollutants prior to discharge to local waterways. (3) encourage the use of Low-Impact Development or green infrastructure to use natural and simple mechanical treatment systems that can effectively treat contaminated water quality and quantity issues; (4) further the intent to capture and treat 100% of the first 1.4" of rainfall or at least 80% of Total Suspended Solids of whatever portion of the first 1.4" that cannot be captured; and (5) encourage design techniques that minimize impervious surfaces and again, reduce stormwater runoff.

G.14 Implement changes to stormwater facilities and management practices to reduce the presence of pollutants regulated under the Clean Water Act and to address the requirements of the Endangered Species Act.

Finding 13: The proposed amendments to the Springfield Development Code are in compliance with the City's MS4 Permit. The City is implementing these changes to portions of the stormwater code requirements to reduce impacts of stormwater runoff on our Drinking Water Protection areas and local waterways.

G.15 Consider wellhead protection areas and surface water supplies when planning stormwater facilities.

Finding 14: A Stormwater Study is required for the installation of a structural stormwater control facility. The Stormwater Study must address any impact on wellhead protection areas, floodplains and floodways, natural resources, wetland and riparian areas, and Water Quality Limited Watercourses. The amendments to the Drinking Water Protection Overlay District includes limitations on stormwater facilities in proximity to wellheads that are necessary to ensure the safety of the city's drinking water supply.

G.16 Manage or enhance waterways and open stormwater systems to reduce water quality impacts from runoff and to improve stormwater conveyance.

Finding 15: The code amendments manage and enhance the City's waterways and stormwater systems by:

- Capturing the first 1.4" of rainfall or at least 80% of Total Suspended Solids of whatever portion of the first 1.4" that cannot be retained onsite. This reduces our stormwater runoff impact and improves stormwater conveyance;
- Enhancing our water quality and protecting the McKenzie and Willamette rivers from said runoff helps shield properties and infrastructure from flooding.

G.17 Include measures in local land development regulations that minimize the amount of impervious surface in new development in a manner that reduces stormwater pollution, reduces the negative effects from increases in runoff, and is compatible with Metro Plan policies.

Finding 16: The purpose of these code amendments is to review and update post-construction requirements for development and redevelopment, especially for project sites that create or replace 5,000 square feet or more of impervious area and remove barriers to low impact development and green infrastructure. The amended development code minimizes the

amount of impervious surface in new developments by encouraging the use of vegetated stormwater facilities or permeable pavements in required landscaping for buildings, parking lots and parking strips, and open spaces. Amending the code to implement the MS4 permit requirements for structural stormwater controls not only reduces the negative effects from stormwater pollution and increases in runoff but is also compatible with the Metro Plan policies.

Conformance with Applicable State Statutes

Finding 17: ORS 197.610 requires local jurisdictions to submit proposed comprehensive plan or land use regulation changes to the Department of Land Conservation and Development (DLCD). Notice of the proposed amendments to the Springfield Development Code was provided to DLCD 35 days in advance of the Planning Commission public hearing in compliance with ORS 197.610 and ORS 197.620(3). Therefore, the amendments are consistent with the state statute.

Finding 18: ORS 227.186 requires the local government to mail a notice to every landowner whose property is proposed to be "rezoned" as a result of adoption or amendment of a proposed ordinance (also known as "Ballot Measure 56" notice). Rezoning under ORS 227.186 includes an ordinance that amends or adopts regulations that limit or prohibit land uses previously allowed in the affected land use district. Specifically, the proposed code amendments affect the "uses" allowed in the Drinking Water Protection Area by prohibiting stormwater infiltration facilities within 100' of any drinking water wellhead. Because this amendment would prohibit stormwater infiltration and affect property setbacks, Measure 56 notice is warranted. This notice was not provided within 21 days of the initial hearing on August 1; however, the notice issue is cured by continuing the public hearing with the Springfield and Lane County Planning Commissions until September 5, 2023.

Finding 19: ORS 197.307(4) requires that jurisdictions "may adopt and apply only clear and objective standards, conditions and procedures regulating the development of housing" and "may not discourage needed housing through unreasonable cost or delay". The proposed amendments allow residential development to meet the stormwater management standards through compliance with the Site Performance Standard in SDC 4.3.110(C)(2). This is a clear and objective standard requiring on-site retention of the first 1.4" of stormwater, which corresponds to the 80th percentile storm event. The appendices referenced in SDC 4.3.110 provide clear and objective design standards for a variety of stormwater facilities that could be used to meet the Site Performance Standard. Compliance with the site performance standard will not result in unreasonable costs or delays because (1) it is a requirement that the City must impose under the MS4 permit, (2) it requires on-site retention of the 80th percentile storm, which is a reasonable target for development to achieve, and (3) it provides options for treatment facility types in the code appendices. As permitted in ORS 197.307(6), SDC 4.3.110(C)(2)(b) provides a discretionary alternative treatment standard if the applicant demonstrates that it is technically infeasible to meet the Site Performance Standard. ORS 468A.050 requires the City to obtain a permit from the DEQ in order to discharge any wastes into the waters of the state from any industrial or commercial establishment or activity or any disposal system, or to construct, install, modify or operate any disposal system or part thereof or any extension or addition thereto. Development within the City of Springfield that adds impervious surface results in rainwater

runoff that may be discharged ultimately into state waters of the McKenzie River or Willamette River in and near Springfield. The City's MS4 permit authorizes the City to continue to convey stormwater runoff into waters of the state. These development code amendments are required to be in compliance with the MS4 permit and therefore in compliance with ORS 468A.050.

Conformance with Applicable State-wide Planning Goals and Administrative Rules

Statewide Planning Goal 1 – Citizen Involvement. To develop a citizen involvement program that provides the opportunity for citizens to be involved in all phases of the planning process.

Finding 20: Requirements under Goal 1 are met by adherence to the citizen involvement process required by the Metro Plan and implemented by the Springfield Development Code. As detailed above, a public outreach process occurred during the development code amendment process. The amendments are subject to the Type IV legislative procedure, which requires public notification and public hearings before the Planning Commission and City Council. The procedure has been established by the City and determined to be consistent with the City's acknowledged Citizen Involvement Program and Statewide Planning Goal 1. The public hearing notice and hearings before the Planning Commission and City Council and Springfield Oregon Speaks (Springfield's public outreach website) are recognized as opportunities for citizen participation. Therefore, the amendments are in compliance with Goal 1.

Statewide Planning Goal 2 – Land Use Planning. To establish a land use planning process and policy framework as a basis for all decisions and actions related to use of land and to assure an adequate factual basis for such decisions and actions.

Finding 21: This goal outlines the land use planning process and policy framework. The Metro Plan, Springfield Comprehensive Plan, and Springfield Development Code have been acknowledged by DLCD as being consistent with the Statewide Planning Goals. The City has followed the land use planning process and policy framework established in the City's acknowledged comprehensive plan elements and Springfield Development Code as a basis for all decision and actions related to the use of land and to assure an adequate basis for such decisions and actions.

Finding 22: The Stormwater Post-Construction Requirements included in the code amendments will be adopted by the City Council and Lane County Board of County Commissioners after the November 6, 2023 Public Hearing. Opportunities have been provided for review and comment by citizens and local governments.

Finding 23: The amendments originate from the Department of Environmental Quality's (DEQ) approval of the City's MS4 permit which require the City to regulate post-construction site runoff and minimize barriers to low impact development and green infrastructure. As stated in the background, these amendments would allow and encourage the use of stormwater treatment facilities including swales, rain gardens, and pervious pavements and strengthen requirements that address stormwater quality issues and improve the quality of water in the City's drinking water protection areas.

Finding 24: Furthermore, the need for stormwater code updates was addressed in *Appendix F of the Springfield Stormwater Facilities Master Plan* (*Detailed Summary of Recommended Changes to Standards and Codes*). The memorandum identified a number of code changes needed to meet goals, policies, and implementation actions in the City of *Springfield Stormwater Management Plan* (2004). They include:

- Up-to-date Standards, With Regional Consistency
- Reduce Impacts of Streets and Parking Lots
- Specifically Allow & Encourage Vegetated Stormwater Facilities in Development Site Landscaping
- Improve Water Quality Protection Requirements in the Drinking Water Protection District
- Improve Tree & Vegetation Protection Standards
- Improve Erosion Prevention
- Expand and Fully Implement the LDAP
- [Implement] Maintenance Practices

Staff analyzed these recommendations and the current code to address those implementation actions that were not already implemented with the 2022 Development Code Update Project or were in existing code following updates that occurred from 1998 to 2007.

Finding 25: Recommendations that weren't addressed during the previous code amendments or are required in the MS4 permit are addressed in the Stormwater Post-Construction Requirements Update including: updating the code to be consistent with regional standards as recommended by The Springfield Stormwater Facilities Master Plan for infiltration stormwater quality facilities; allowing and encouraging vegetated stormwater facilities (including Low Impact Development); improving the water quality protection requirements and tree and vegetation protection standards; and codifying the maintenance responsibilities and ownership for stormwater quality facilities. Therefore, the amendments are in compliance with the MS4 permit and Goal 2.

Statewide Planning Goal 3 – Agricultural Lands. To preserve agricultural lands.

Finding 26: The amendments are for property located within the urban growth boundary of Springfield and do not affect any land designated for agricultural use. Therefore, Goal 3 does not apply.

Statewide Planning Goal 4 – Forest Lands. To conserve forest lands.

Finding 27: The amendments are for property located within the urban growth boundary of Springfield and do not affect any land designated for forest use. Therefore, Goal 4 does not apply.

Statewide Planning Goal 5 – Open Spaces, Scenic and Historic Areas, and Natural Resources. To conserve open space and protect natural and scenic resources.

Finding 28: The Springfield Development Code is currently acknowledged to be in compliance with Statewide Planning Goal 5. Pursuant to OAR 660-023-0250(3) local governments are not required to apply Goal 5 in consideration of an amendment unless the

amendment affects a Goal 5 resource. The amendment would only affect the resource if it: creates or amends a resource list or portion of an acknowledged plan that protects or addresses specific requirements of a Goal 5; allows new uses that could conflict with a Goal 5 resource; or the amendment affects an acknowledged UGB and information is submitted demonstrating that a resource site is included in the amended UGB area.

Finding 29: The amendments do not create or amend the City's list of Goal 5 resources, do not allow new uses that could conflict with a Goal 5 resource, and do not amend the acknowledged UGB. The amendments change code provisions that apply to significant Goal 5 resources that are classified as Water Quality Limited Watercourses (WQLWs) by moving provisions regarding identification of WQLWs and protection of riparian area functions from SDC 4.3.110 to 4.3.117. However, this change is for code organization purposes only and does not change the substance of any code requirements or standards that apply to WQLWs. Therefore, the amendments are in compliance with Goal 5.

Statewide Planning Goal 6 – Air, Water and Land Resources Quality. To maintain and improve the quality of the air, water and land resources of the state.

Finding 30: Goal 6 addresses waste and discharges from development and is aimed at protecting air, water and land from impacts from those discharges. This goal requires local comprehensive plans to implement measures that are consistent with state and federal regulations on matters such as groundwater pollution. Goal 6 does not provide a legal standard that is independent of what the state and federal water quality programs require, which are administered by DEQ under the MS4 permit program in this matter. Instead, Goal 6 works in concert with those standards to ensure that land use planning and regulations prohibit discharges from development that 'threaten to violate, or violate applicable state or federal environmental quality statutes, rules and standards.' The proposed stormwater amendments do not authorize any new development or increase intensity of development in way that threatens to violate state or federal regulations.

Finding 31: The City's MS4 permit requires the City to continue to implement its post-construction stormwater pollutant and runoff control program. Additionally, the permit requires that by February 2024, the City's program as it applies to new development and redevelopment projects will:

1) Implement the use of structural stormwater controls at all qualifying sites that create or replace 5,000 square feet or more of impervious surface area or disturb one or more acres of land;

2) Identify, minimize or eliminate ordinance, code and/or development standard barriers that inhibit Low Impact Development and Green Infrastructure, which is intended to minimize impervious surfaces and reduce stormwater runoff. Most of the development code amendments outside of SDC 4.3.110 Stormwater Management reduce barriers to using Low Impact Development and Green Infrastructure;

3) Implement a site-specific stormwater management approach that targets natural surface or predevelopment hydrological function through the installation, operation, and maintenance of structural stormwater controls. The permit allows the City to establish a site performance standard that is either volume based (for example, capture the first inch of each storm

event), storm event percentile-based (for example, the 95th percentile storm event), or annual average runoff-based (for example, 80% of annual average runoff). The Site Performance Standard requiring capture of the first one and four tenths inches (1.4") of rainfall from each storm event is a volume-based standard that correlates to historical rainfall data for the Eugene-Springfield area, so that 80% of all storm events will be fully infiltrated on-site under this standard. If the Site Performance Standard cannot be met due to site constraints or technical infeasibility, the site must infiltrate as much rainfall as practicable. The remainder of the runoff up to 1.4" must meet the Treatment Standard to remove at least 80% of Total Suspended Solids .Review and approve structural stormwater control plans for new development and redevelopment projects for sites that disturb one or more acres of land and sites that use the alternative treatment standard mentioned above; and

4) Maintain an inventory and implement a strategy to ensure that all structural stormwater controls are installed in compliance with the MS4 permit and operated and maintained to meet the Site Performance Standard mentioned above.

Finding 32: The proposed amendments are necessary to comply with the DEQ requirements in the City's MS4 permit, which is what is required by Goal 6. Therefore, the amendments are consistent with Goal 6.

Statewide Planning Goal 7 – Areas Subject to Natural Disasters and Hazards. To protect life and property from natural disasters and hazards.

Finding 33: Goal 7 requires local government planning program include provisions to protect people and property from natural hazards such as floods, landslides, earthquakes and related hazards, tsunamis and wildfires. The Goal prohibits development in natural hazard areas without appropriate safeguards. The Springfield Development Code is acknowledged to be in compliance with Goal 7. The amendments do not alter the City's acknowledged land use programs regarding landslide areas (SDC 3.3.500, Hillside Development Overlay) or flood protection (SDC 3.3.400). Therefore, the Stormwater Post-Construction Requirements Update project is in compliance with Goal 7.

Statewide Planning Goal 8 – Recreational Needs. To satisfy the recreational needs of the citizens of the state and visitors, and where appropriate, to provide for the siting of necessary recreational facilities including destination resorts.

Finding 34: Recreational services within Springfield is the responsibility of Willamalane Park & Recreation District. Willamalane has an adopted 20-Year Comprehensive Plan for the provision of park, open space and recreation services for Springfield. This goal is not applicable to the Stormwater Post-Construction Requirements Update project and the amendments will have no effect on the availability of or access to recreational opportunities as planned in Willamalane's Comprehensive Plan. Therefore, the updates are in compliance with Goal 8.

Statewide Planning Goal 9 – Economic Development: To provide adequate opportunities throughout the state for a variety of economic activities vital to the health welfare, and prosperity of Oregon's citizens.

Finding 35: Goal 9 requires the City to "provide for at least an adequate supply of sites of suitable sizes, types, locations, and service levels for a variety of industrial and commercial uses consistent with plan policies." The City's adopted Economic Opportunities Analysis and Commercial Industrial Buildable Lands Inventory is acknowledged to comply with Goal 9. The amendments do not impact the supply of industrial or commercial lands.

Finding 36: The Stormwater Post-Construction Requirements do not render any property unusable for commercial or industrial uses. The amendments prioritize the selection of structural stormwater controls to capture and retain as much stormwater runoff as feasible onsite. Applicants that qualify for the Alternative Treatment Standard due to technical infeasibility and/or site constraints does not restrict any buildable land area; it merely requires that development target an equivalent water quality benefit as onsite retention. An applicant demonstrates technical infeasibility by submitting a report demonstrating that the required size of the structural stormwater control needed for the development's impervious surface area would not be feasible or would need to be reduced to meet the Site Performance Standard.

Finding 37: The code amendments retain the existing minimum development areas and broad categories of uses that are currently allowed in each land use district, which maintains the existing inventory of sites suitable for a variety of employment uses. Therefore, the amendments are consistent with Goal 9.

Statewide Planning Goal 10 – Housing. To provide for the housing needs of citizens of the state.

Finding 38: Goal 10 requires jurisdictions inventory buildable lands for residential use and develop plans that encourage the availability of adequate numbers of needed housing units at price ranges and rent levels which meet the financial capabilities of Oregon households and allow for flexibility of housing location type and density. The City of Springfield completed a Housing Needs Analysis and Buildable Lands Inventory in 2011. This document serves as the City's compliance document under Goal 10 and provides the basis for the City's determination that Springfield's UGB has sufficient buildable land to meet the identified housing needs during the 20-year planning period.

Finding 39: The Stormwater Post-Construction Requirements Update amendments do not conflict with Goal 10 because they preserve the City's inventory of buildable residential lands, by either not changing or not increasing the overall net density that may be constructed on residentially designated land. The amendments are more restrictive in terms of how much impervious surface area can be built before a structural stormwater control is required (development that creates or replaces 5,000 square feet or more of impervious surface area; development that disturbs one or more acres of land within the development area; and development that generates peak flows in excess of 0.5 cubic feet per second within the development area).

Finding 40: The amendments do not regulate if development can occur, but rather how development is done. The new regulations:

- Add specific standards for structural stormwater controls to capture the first one and four tenths inches (1.4") of rainfall from each storm event (Site Performance Standard) and route the stormwater to one or more structural stormwater controls or if that

standard cannot be met, the remainder of the runoff must be treated to remove at least 80% of Total Suspended Solids (Treatment Standard) (SDC 4.3.110(C)(2));

- Specifically require that any development that cannot meet the Site Performance Standard in SDC 4.3.110(C)(2) demonstrate that an Alternative Treatment Standard is proposed due to technical infeasibility or site constraints including but not limited to: shallow bedrock, high groundwater, protection of groundwater from contamination, soil instability as documented by a geotechnical analysis, land use that is inconsistent with capture and infiltration of stormwater, the known presence of soil contamination, or constraints arising under the provisions of the Drinking Water Protection Overlay District in SDC 3.3.200. Any structural stormwater controls used to meet the Treatment Standard must incorporate Low Impact Development (LID) to the maximum extent practicable (SDC 4.3.110(D)2) and SDC 4.3.110(D)(4));
- Change the City's requirements for Stormwater Study Types to describe how the proposed stormwater management approach targets the natural surface or predevelopment hydrologic function of the area through the installation of a structural stormwater control. It must also address the facilities impact on offsite flows, drainage areas, environmentally sensitive areas, flood elevations or flood ways, and their proximity to natural resource areas.

These design requirements do not have a material effect on the density of residential development. Thus, the amendments do not reduce the development potential of Springfield's housing land inventories in a manner inconsistent with Goal 10.

Statewide Planning Goal 11 – Public Facilities and Services. To plan and develop a timely, orderly and efficient arrangement or public facilities and services to serve as a framework for urban and rural development.

Finding 41: Goal 11 requires the City to plan and develop an efficient arrangement of public facilities and services to serve urban and rural development. Pursuant to OAR 660-011-0020(2) a public facility plan must identify significant public facility projects which support the land uses designated in the comprehensive plan. The Eugene-Springfield Metropolitan Area Public Facilities and Services Plan (PFSP) and the Springfield 2035 Transportation System Plan (TSP) are the City's acknowledged public facilities and transportation plans that inform infrastructure investments (i.e., water, stormwater, wastewater, electricity, and transportation). The TSP is addressed under Goal 12 below. There are no changes to the PFSP in conjunction with these amendments, and the project is otherwise consistent with Goal 11 as explained below.

Finding 42: The code updates comply with Goal 11 because they do not result in any need to amend the PFSP to include additional or different public facilities projects. OAR 660-011-0045(4) states that "Land use amendments that are those modifications or amendments to the list, location or provider of, public facility projects, which significantly impact a public facility project identified in the comprehensive plan and which do not qualify under subsection (3)(a) or (b) of this rule. Amendments made pursuant to this subsection are subject to the administrative procedures and review and appeal provisions accorded "land use decisions" in ORS Chapter 197 and those set forth in OAR Chapter 660 Division 18." The amendments do not modify or amend the list, location or provider of public facility projects identified in the Eugene-Springfield Public Facilities Plan. Furthermore, OAR 660-011-0020(2) requires the public facility plan to identify significant public facility projects which support the land uses designated in the comprehensive plan. Because these amendments will require more onsite retention and treatment than when

the PFSP was written, it will reduce the need for public stormwater facilities in the future as compared to the prior code. Therefore, the amendments do not change the designations or categories of any residential, employment, commercial, industrial, or urbanizable lands and are consistent with Statewide Planning Goal 11.

Statewide Planning Goal 12 – Transportation. To provide and encourage a safe, convenient and economic transportation system.

Finding 43: The Transportation Planning Rule (TRR), at OAR 660-012-0060, requires the City to adopt mitigation measures whenever "an amendment to a functional plan, an acknowledged comprehensive plan, or a land use regulation (including a zoning map) would significantly affect an existing or planned transportation facility." An amendment causes a significant effect under the TPR when it changes the functional classification of an existing or planned transportation facility, changes the standards for implementing the functional classification system, or results in any of the effected listed in OAR 660-012-0060(1)(A) - (C) regarding degradation of the performance of an existing or planned transportation facility.

Finding 44: A land use regulation amendment "significantly affects" transportation under Subsection 1(a) if it *"Change[s] the functional classification of an existing or planned transportation facility (exclusive of correction of map errors in an adopted plan)."* The amendments do not change any functional classification under OAR 66-012-0060(1)(a).

Finding 45: A land use regulation amendment "significantly affects" transportation under Subsection 1(b) if it *"Change[s] standards implementing a functional classification system."* The amendments do not change the City's standards for implementing its functional classification system under OAR 66-012-0060(1)(b).

Finding 46: Under Subsection (1)(c), a land use regulation amendment "significantly affects" transportation if it results in *(A) types or levels of travel or access inconsistent with the functional classification of a transportation facility; (B) degrades the performance of a transportation facility such that it would not meet performance standards identified in the TSP or comprehensive plan; or (C) degrades the performance of a transportation facility that is otherwise projected to not meet the performance standards in the TSP or comprehensive plan.* To determine whether the amendments "significantly affect" a transportation facility within the meaning of (1)(c) a local government should compare the most traffic-generative use reasonably allowed in the current zone with the most traffic-generative use reasonably allowed in the new zone.

Finding 47: OAR chapter 660, Division 12 includes provisions adopted under the "Climate Friendly and Equitable Communities" rules adopted and certified effective on August 17, 2022, as amended by temporary rules effective May 12, 2023 through November 7, 2023. These provisions are either not yet operative for the City of Springfield under OAR 660-012-0012 or apply only upon amendment to the Springfield Transportation System Plan. Amendments to Springfield's Transportation System Plan do not accompany the subject amendments, and therefore the remaining provisions of OAR chapter 660, Division 12, are not applicable.

Finding 48: The amendments do not change the underlying zoning districts or change the uses that are allowed. Accordingly, the amendments do not change the most traffic-generative

uses allowed and therefore do not result in any of the effects described under (A)-(C). The amendments to the code will not "significantly affect" an existing or planned transportation facility under OAR 660-012-0060(1)(a), (b), or (c). Therefore, the amendments are consistent with OAR 660-012-0060 and Statewide Planning Goal 12.

Goal 13 – Energy Conservation. To conserve energy.

Finding 49: The City does not have specific Goal 13 regulations. However, conservation of water as a renewable energy source is a policy under Goal 13. Goal 13 Policy A. 5. states: "Plans directed toward energy conservation within the planning area should consider as a major determinant the existing and potential capacity of the renewable energy sources to yield useful energy output. Renewable energy sources include water, sunshine, wind, geothermal heat and municipal, forest and farm waste. Whenever possible, land conservation and development actions provided for under such plans should utilize renewable energy sources." The code amendments further Goal 13's policy for energy conservation by prioritizing infiltration, evapotransporation, and the re-use of stormwater before it is discharged to our public system or local waterbodies. Therefore, the amendments are consistent with Statewide Planning Goal 13.

Goal 14 –Urbanization. To provide for an orderly and efficient transition from rural to urban land use.

Finding 50: Goal 14 requires cities to estimate future growth rates and patterns, and to incorporate, plan, and zone enough land to meet the projected demands. The amendments do not affect the existing code provisions regarding the transition of land from rural to urban uses or annexation. The code provisions regarding urbanizable land are contained in the Urban Fringe Overlay District and the Agricultural Urban Holding Area district. There are no proposed amendments to these sections or standards. Therefore, the amendments are consistent with the requirements of Statewide Planning Goal 14.

Goal 15 –Willamette River Greenway. To protect, conserve, enhance and maintaint he natural, scenic, historical, agricultural, economic and recreational qualities of lands along the Willamette River as the Willamette River Greenway.

Finding 51: Statewide Planning Goal 15 requires cities to adopt local greenway plans, along with criteria for new development or uses along the river. Pursuant to SDC 3.3.320(A), uses allowed in the Willamette Greenway Overlay District are the same as those in the underlying zoning district; thus the Stormwater Post Construction Requirements Update amendments do not repeal, replace, or void these existing code provisions related to Goal 15. Furthermore, no changes are proposed to the existing overlay protections from this amendment. Therefore, the amendments are consistent with the requirements of Statewide Planning Goal 15.

Goal 16 – 19 Estuarine Resources, Coastal Shorelands, Beaches and Dunes, and Ocean Resources.

Finding 52: Statewide Planning Goals 16 – 19 relate to coastal lands in Oregon, which are not applicable within the planning jurisdiction of the City of Springfield and are not applicable to the amendments.

VI. CONCLUSION

Based upon the evidence above and the criteria of SDC 5.6.115 for approving amendments to the Springfield Development Code, the text amendments to SDC 4.3.110 and various other sections for stormwater management are consistent with these criteria.

Legislative Version of Proposed Amendments to the Springfield Development Code Section 4.3.110 Stormwater Management to Incorporate MS4 Permit Requirements

First Public Hearing Draft – August 1, 2023
Second Public Hearing Draft – September 5, 2023

PROPOSED AMENDMENTS
Various Sections of the Springfield Development Code (SDC) are amended to remove barriers to Low-Impact Development and define stormwater terms. SDC 4.3.110 has been re-organized to more closely match the structure and requirements of the MS4 Permit. The proposed amendments are shown in legislative format (deleted text with strike-thru red font and new text with double underline red font). For ease of review, this legislative format does not show where code language was moved from one place to another. Changes shown since the first Public Hearing on August 1, 2023 are highlighted in yellow. Commentary is shown in purple italics font, preceding the text to which it is referring.

3.2.450 CI District—Design Standards

Commentary: *The recommendation to amend this section comes from the City of Springfield Stormwater Facilities Master Plan (2008) which proposed that the code be amended to allow vegetated stormwater quality features in the landscaping. Consistent with the MS4 Permit, vegetation may be permitted within structural stormwater controls.*

In the CI District, new buildings; expansions of, or additions to existing buildings; or improvements to existing façades that require a building permit shall provide architectural designs that encourage flexibility and innovation in site planning by complying with the following on-site design standards:

(B) **Landscaping.** The following landscaping standards are in addition to standards specified in SDC 4.4.105:

(1) A minimum of 35 percent of each development area shall be landscaped open space.

(2) Plants shall be sized to attain 90 percent coverage of required landscape areas (excluding tree canopies), within 3 years of installation. Plantings of native species and plant communities shall achieve 90 percent coverage within 5 years of installation.

(3) At least 10 percent of the interior of a parking lot having 20 or more parking spaces shall be landscaped. This standard is in addition to any landscaping setbacks required in SDC 3.2.420.

(4) Natural assets identified in the Gateway Refinement Plan, any other applicable refinement plan or elsewhere in this Code shall be included in the site design and protected. Where protection of these natural assets prevents the development of the site consistent with this Code, the functional equivalent of the natural assts may be substituted as may be allowed by the City.

(5) Vegetation within a structural stormwater control that complies with SDC 4.3.110 may be counted toward the minimum landscaping requirements of this section.

3.2.625 Mixed-Use District Development Standards—General.

Commentary: *The recommendation to amend this section comes from the City of Springfield Stormwater Facilities Master Plan (2008) which proposed that the code be amended to allow vegetated stormwater quality features in the landscaping. Consistent with the MS4 Permit, the City must encourage the use of Low Impact Development stormwater facilities. The word "shall" was replaced with "must" to clarify that the requirements are mandatory.*

Mixed-use zoning districts require special attention to building design because of the intermixing of land uses and higher intensity of development that can occur in these areas. The standards below implement commonly accepted design principles with the goal to achieve more attractive, functional and pedestrian oriented design. Not every case and circumstance is anticipated by these standards, nor is it the goal of this section to prescribe every design detail of development. It is expected that the Springfield development community will apply their own design creativity to build on these principles and create attractive, livable, and viable projects. The standards below provide an objective framework for achieving the desired goal of attractive, pedestrian oriented development. Developers may choose to meet these standards as prescribed, or they may propose other design ideas which are equal or superior to a particular standard in meeting the design objectives in subsections (A) through (G), below. Where developers request an exemption from a stated standard, it is their responsibility to propose an alternative design and to demonstrate to the Director that it is equal or superior to the stated standard. The Director has the authority to authorize an exception to these standards and determine the acceptability of an alternative design the developer proposes. When developers propose alternative designs that are not acceptable to the Director, they may appeal the decision as specified in SDC 5.3.115.

(D) Landscaping and Screening.

(1) **Intent.** Landscaping is intended to compliment built forms within a development area, softening and providing visual relief and contrast to buildings, sidewalks, parking lots, and provide opportunities for stormwater controls including Low Impact Development. Trees, as part of a landscaping plan, ~~shall~~ must provide shade for pedestrian comfort as well. The installation of landscaping ~~shall~~ must be accomplished in a manner that assures that planted stock receives adequate irrigation. Screening is intended to compliment a development area by shielding trash receptacles, storage areas and other unsightly facilities from public view within the development area.

(a) Mixed-use developments ~~shall~~ must provide landscaping and screening in accordance with SDC ~~4.4.100~~ 4.4.105 and 4.4.110 and the following standards:

(b) Street trees ~~shall~~ must be required consistent with SDC 4.2.140. Species ~~shall~~ must be compatible with the design features specified in subsection (G), below and ~~shall~~ must provide continuity with nearby landscaping. The Director may grant a 1-for-1 reduction in the number of street trees

required when a development preserves healthy, mature trees located within 10 feet of the sidewalk. Required street trees ~~shall~~ must be placed in planter strips between sidewalks and curbs as specified in SDC 4.2.135 and 4.2.140, or in individual tree pits. If individual tree pits are utilized, each pit ~~shall~~ must be a minimum of 64 square feet per tree, with a minimum width of 4.5 feet.

(2) Screening of parking areas, drives, mechanical equipment and trash receptacles ~~shall~~ must meet ~~be as specified in~~ SDC 4.4.110. In addition:

(a) No trash receptacles ~~shall be~~ are allowed within the front setback areas abutting residential districts.

(b) All ground-mounted utility equipment not installed underground ~~shall~~ must be placed to reduce visual impact or screened with walls or landscaping.

(c) Notwithstanding the timelines specified in SDC 4.4.105, plants ~~shall~~ must be sized to attain 50 percent coverage in 2 years and 100 percent coverage in 4 years.

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Drinking Water Protection Overlay District

Commentary: *The Drinking Water Protection Overlay District was amended with the input of Springfield Utility Board's Drinking Water Source Protection Coordinator and the City of Springfield Stormwater Facilities Master Plan (2008). Amendments allow an exception to the prohibition of dry wells for roof drainage, to prohibit permeable pavements in the 0-1 year time of travel zone, to clarify an exemption for the use of materials including liquid fuel for generators, clarified terms throughout 3.3.200, and to prohibit stormwater infiltration in a 100' buffer around wellheads per guidance from Oregon Health Authority. The applicability of the DWP Overlay standards in SDC 3.3.235 was revised to clarify that – even when no DWP Overlay permit application is required – development must comply with any applicable requirements of the overlay district. For instance, infiltration facilities within 100 feet of a wellhead would be prohibited even if a development did not otherwise trigger the need for a DWP Overlay permit.*

Note: The exception to 3.3.230(B)(3) was revised so that it would not nullify (B)(9)'s regulatory exemption for emergency generators. The EXCEPTION language was moved to apply under (B)(3) only. Language was also added to the start of 3.3.235 to clarify that development must comply with the Drinking Water Protection requirements even if an application isn't required (e.g., the prohibited uses are still prohibited even if the City is not requiring an application submittal). Furthermore, the City may seek enforcement if a permitted use starts to use hazardous materials in a new way that would conflict with the Drinking Water Protection Overlay.

3.3.220 Time of Travel Zones.

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(B) The areas within specified wellhead TOTZ are those drinking water protection areas certified by the Oregon Health ~~Division~~ Authority, under the Oregon Administrative Rules that apply to Oregon's EPA-approved Drinking Water Protection Program, in Oregon Health Authority Delineation Certification #0002R, Version 2~~March 18, 1999~~.

(C) In determining the location of a property within a TOTZ, the following criteria apply:

(1) The Lane County Department of Assessment and Taxation maps shall be used as a base map with the addition of TOTZ boundaries.

(2) That portion of a tax lot that lies within a TOTZ is governed by the restrictions applicable to that TOTZ.

(3) Tax lots having parts lying within more than one TOTZ are governed by the standards of the more restrictive TOTZ.

EXCEPTION: The Director may waive the requirement that the more restrictive standards apply when all of the following apply:

(a) Storage, use, handling, treatment, and/or production of hazardous or other materials that pose a risk to groundwater will not take place within the portion of the tax lot having the more restrictive TOTZ standards; and

(b) Storage, use, handling, treatment, and/or production of hazardous or other materials that pose a risk to groundwater will not take place within 50 feet of the portion of the tax lot having more restrictive TOTZ standards; and

(c) The tax lot is 20,000 square feet or larger.

(4) A property owner may request the TOTZ be modified by submitting a Zone Change application to the City. Any request for modification of the TOTZ shall be accompanied by certification of the TOTZ as proposed to be modified by the Oregon Health Authority ~~Division~~, under the Administrative Rules that apply to Oregon's EPA-approved Drinking Water Protection Program. (6238)

3.3.225 Review.

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(D) Prior to undertaking an activity covered by SDC 3.3.225(A), the owner or tenant shall submit a DWP Overlay District Application to the City for review and approval. Applications shall include the following information:

(1) A Hazardous Material Inventory Statement and a ~~Material~~ Safety Data Sheet for any or all materials entered in the Statement unless exempted under SDC 3.3.230. Hazardous material weights shall be converted to volume measurement for purposes of determining amounts; 10 pounds shall be considered equal to 1 gallon as specified in Springfield Fire Code 5003.1.2;

(2) A list of the chemicals to be monitored through the analysis of groundwater

samples and a monitoring schedule if ground-water monitoring is anticipated to be required;

(3) A detailed description of the activities conducted at the facility that involve the storage, handling, treatment, use or production of hazardous or other materials that pose a risk to groundwater ~~materials~~ in quantities greater than the maximum allowable amounts as stated in SDC 3.3.235(A);

(4) A description of the primary and any secondary containment devices proposed, and, if applicable, clearly identified as to whether the devices will drain to the storm or sanitary sewer;

(5) A proposed Hazardous Material Management Plan for the facility that indicates procedures to be followed to prevent, control, collect and dispose of any unauthorized release of a hazardous material;

(6) A description of the procedures for inspection and maintenance of containment devices and emergency equipment;

(7) A description of the plan for disposition of unused hazardous materials or hazardous material waste products ~~over the maximum allowable amounts~~ including the type of transportation, and proposed routes.

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3.3.230 Exemptions.

This section does not exempt any material or use from Fire Code regulations adopted by the City.

(A) Exemptions are as specified in this section unless the Director, in consultation with SUB and Fire/Life Safety, determines that a hazardous material, activity, and/or facility that is exempt pursuant to this section has a significant or substantial potential to degrade groundwater quality. Then the Director may require compliance with the requirements of this section related to that hazardous material, activity, or facility. This determination will be based upon site and/or chemical-specific data and is ~~are~~ eligible for appeal to the Hearings Officer as specified in SDC 3.3.245.

(B) Unless otherwise provided herein, the following materials are exempt from regulation hereunder:

(1) Use, storage and handling of specific hazardous materials that do not present a risk to the aquifer, as determined and listed by the Director in consultation with SUB, are exempt from all regulation under this section with the exception of the potential requirement to list these hazardous materials on the Hazardous Material Inventory Statement as found in the most recent Fire Code regulations adopted by the City. A Drinking Water Protection ~~Hazardous Materials~~ Exemption Request may be submitted to the Director for Hazardous Materials that can be demonstrated to pose no threat to the aquifer. These materials may be exempted from regulation ~~and added to the list~~. The demonstration of no

threat is the responsibility of the applicant seeking the exemption and will be subject to review by technical experts.

(2) Hazardous materials offered for sale in their original sealed containers of 5 gallons or less are exempt from the 500-gallon storage limit specified in SDC 3.3.235(A)(1).

(3) Hazardous materials in fuel tanks and fluid reservoirs including, but not limited to fuel, engine oil, and coolant, which are attached to a private or commercial motor vehicle and used directly in the motoring operation of that vehicle, or machinery~~, including, but not limited to: fuel, engine oil and coolant~~

EXCEPTION: Portable generators are not exempt.

(4) Fuel oil used in existing heating systems.

(5) Emergency use, storage, and handling of hazardous materials by governmental organizations in the public interest.

(6) Hazardous materials used and stored specifically for water treatment processes of public water systems and private systems for the same purposes when approved by the Director.

(7) Hazardous materials contained in properly operating sealed units (including, but not limited to: transformers, refrigeration units) that are not opened as part of routine use.

(8) Local natural gas distribution lines.

(9) Fuel for emergency generators located at facilities that provide essential community services (including, but not limited to: hospitals, fire/life safety, police, public shelters, wireless telecommunications system (WTS) facilities, and telephone systems).

(10) Any commonly used office supply—including, but not limited to: correcting fluid for typewriters, toner for computer printers or cleaners for windows and bathrooms—where the supplies are purchased off-site for use on-site.

(11) Aggregate quantities equal to or less than 20 gallons of hazardous materials that do not contain DNAPLs.

~~EXCEPTION: Liquid fuel for generators are not exempt from the regulations in SDC 3.3.230(B).~~

3.3.235 Standards for Hazardous Materials within Time of Travel Zones.

Applications required under SDC 3.3.225(A) must ~~shall~~ comply with the following standards. Notwithstanding SDC 3.3225(A), development that conflicts with the standards of this section is prohibited. Where the following standards are more restrictive than the standards of the Springfield Fire Code, the following standards ~~apply:~~ will prevail.

(A) Zero to One Year TOTZ Standards.

(1) Within the zero to one year TOTZ, hazardous or other materials that pose a risk to groundwater may be stored in aggregate quantities of no more than 500 gallons if in original containers not exceeding 5 gallons* in size. Within that aggregated 500-gallon inventory, no more than 150 gallons of hazardous or other materials that pose a risk to groundwater may be on the premises in opened containers for handling, treatment, use production, or dispensing on site. Hazardous or other materials that pose a risk to groundwater are allowed only upon compliance with containment and safety standards specified by the most recent Fire Code adopted by the City.

* A waiver of the 5-gallon maximum size may be given by the Director if the applicant can demonstrate that a larger size container would pose less risk to the aquifer.

(2) Unless exempted, all hazardous or other materials that pose a risk to groundwater shall be stored in areas with approved secondary containment in place (Springfield Fire Code 5002.1 and 5004.2.2).

(3) All new uses of Dense Non-Aqueous Phase Liquids (DNAPLs) are prohibited.

(4) Any change in type of use or an increase in maximum daily inventory quantity of any DNAPL shall be considered a new use and prohibited.

(5) The following certain types of new facilities or changes in use and/or storage of hazardous or other materials that pose a risk to groundwater are prohibited:

(a) Underground hazardous material storage facilities;

(b) Hazardous material product pipelines used to transport the hazardous material off of the tax lot where it is produced or used;

(c) Injection wells;

EXCEPTION: Dry wells for residential roof drainage;

(d) Solid waste landfills and transfer stations;

(e) Fill materials containing hazardous materials;

(f) Land uses and new facilities that will use, store, treat, handle, and/or produce DNAPLs; and

(g) Permeable pavements.

(6) Requirements found in Springfield Fire Code 5004.2.2.5 for a monitoring program and monitoring methods to detect hazardous materials in the secondary containment system shall be met for all amounts of hazardous or other materials that pose a risk to groundwater unless exempted.

(7) The following requirements for inspection and record-keeping procedures for monthly in-house inspection and maintenance of containment and emergency equipment for all amounts of hazardous or other materials that pose a risk to groundwater shall be met unless exempted: Schedules and procedures for inspecting safety and monitoring and emergency equipment. The applicant shall develop and follow a written inspection procedure acceptable to the Director for inspecting the facility for events or practices which could lead to unauthorized discharges ~~or~~ of hazardous materials. An inspection check sheet shall be developed to be used in conjunction with routine inspections. The check sheet shall provide for the date, time, and location of inspection; note problems and dates and times of corrective actions taken; and include the name of the inspector and the countersignature of the designated safety manager for the facility.

(8) Application of fertilizers containing nitrates are restricted to no more than the amount recommended by the Lane County, Oregon State University Extension Service for turf grass and are prohibited within 100 feet of a wellhead. In no event shall a single application exceed one half pound per 1,000 square feet of area per single application or a total yearly application of 5 pounds nitrogen fertilizer per 1,000 square feet.

(9) Stormwater infiltration facilities are prohibited within 100 feet of a wellhead.

(B) One to Five Year TOTZ Standards.

(1) The storage, handling, treatment, use, application, or production or otherwise keeping on premises of more than 20 gallons of hazardous or other materials that pose a risk to groundwater in aggregate quantities not containing DNAPLs ~~are~~ is allowed only upon compliance with containment and safety standards specified by the most recent Fire Code adopted by the City.

(2) Unless exempted, all hazardous or other materials that pose a risk to groundwater shall be stored in areas with approved secondary containment in place (Springfield Fire Code 5002.1 and 5004.2.2).

(3) All new ~~use~~ uses of DNAPLs are prohibited.

(4) Any change in the type of use or an increase in maximum daily inventory quantity of any DNAPL is considered a new use and is prohibited.

(5) The following certain types of facilities or changes in chemical use and/or storage of hazardous or other materials that pose a risk to groundwater are prohibited:

(a) Hazardous material product pipelines used to transport the hazardous material off of the tax lot where it is produced or used;

(b) Injection wells;

EXCEPTION: Dry wells for residential roof drainage;

(6) Requirements found in Springfield Fire Code 5004.2.2.5 for a monitoring program and monitoring methods to detect hazardous ~~or other~~ materials in the secondary containment system shall be met for all amounts of hazardous or other materials that pose a risk to groundwater unless exempted.

(7) The following requirements for inspection and record keeping procedures for monthly in-house inspection and maintenance of containment and emergency equipment for all amounts of hazardous or other materials that pose a risk to groundwater shall be met unless exempted: Schedules and procedures for inspecting safety and monitoring and emergency equipment. The applicant shall develop and follow a written inspection procedure acceptable to the Director for inspecting the facility for events or practices which could lead to unauthorized discharges of~~f~~ hazardous materials. An inspection check sheet shall be developed to be used in conjunction with routine inspections. The check sheet shall provide for the date, time, and location of inspection; note problems and dates and times of corrective actions taken; and include the name of the inspector and the countersignature of the designated safety manager for the facility.

(C) Five to Ten Year TOTZ Standards.

(1) The storage, handling, treatment, use, production or otherwise keeping on premises of more than 20 gallons of hazardous or other materials that pose a risk to groundwater in aggregate quantities not containing DNAPLs is allowed only upon compliance with containment and safety standards specified by the most recent Fire Code adopted by the City.

(2) All hazardous or other materials that pose a risk to groundwater shall be stored in areas with approved secondary containment in place (Springfield Fire Code 5002.1 and 5004.2.2).

(3) All new uses of DNAPLs are prohibited.

(4) Any change in type of use or an increase in the maximum daily inventory quantity of any DNAPL is considered a new use and is prohibited.

(5) The following requirements for inspection and record-keeping procedures for monthly in-house inspection and maintenance of containment and emergency equipment for all amounts of hazardous or other materials that pose a risk to groundwater shall be met unless exempted: Schedules and procedures for inspecting safety and monitoring and emergency equipment. The applicant shall develop and follow a written inspection procedure acceptable to the Director for inspecting the facility for events or practices which could lead to unauthorized discharges of~~f~~ hazardous materials. An inspection check sheet shall be developed to be used in conjunction with routine inspections. The check sheet shall provide for the date, time, and location of inspection; note problems and dates and times of corrective actions taken; and include the name of the inspector and the countersignature of the designated safety manager for the facility.

(D) **Ten to Twenty Year TOTZ Standards.** The storage, handling, treatment, use, production or keeping on premises of more than 20 gallons of hazardous or other materials that pose a risk to groundwater in aggregate quantities is allowed only upon compliance with containment and safety standards specified by the most recent Fire Code adopted by the City. (6443; 6238)

3.3.240 Conditions.

The Director may attach conditions of approval that will minimize negative impacts of regulated substances on groundwater and ensure that the facility or the proposed development can fully meet the standards specified in SDC 3.3.235. These conditions may include, but are not limited to: on-site monitoring wells, Wellhead Protection Area signs, special storm-water facilities, or other conditions to address specific risks associated with the proposed development.

Commentary: *The recommendation to amend this section comes from the City of Springfield Stormwater Facilities Master Plan (2008) which proposed that the code be amended to encourage green street design (with the use of swales, planters, rain gardens and other features to reduce runoff and pollutants) and to comply with the MS4 Permit to encourage the use of Low Impact Development.*

4.2.100 Infrastructure Standards – Transportation

4.2.105 Public Streets.

(C) Minimum street curb-to-curb widths and minimum street right-of-way widths are as specified in Table 4.2.1, unless otherwise indicated in the Springfield Transportation System Plan, an applicable Refinement Plan, Plan District, Master Plan, Conceptual Development Plan, or the adopted bicycle and pedestrian plan; where necessary to achieve right-of-way and street alignment; or as needed to meet site-specific engineering standards, including, but not limited to, requirements for multi-way boulevard and/or modern roundabout designs. Streets may include Low Impact Development approaches, such as stormwater planters, swales, rain gardens and tree planting to reduce stormwater runoff from impervious surfaces. Example street layouts meeting minimum street standards are provided in Figures 4.2.B through 4.2.V for illustrative purposes only. These Figures are intended to demonstrate potential street configurations that meet the requirements.

Commentary: *The recommendation to amend this section comes from the City of Springfield Stormwater Facilities Master Plan (2008) which proposed that the code be amended to allow stormwater quality facilities in sidewalks. Low Impact Development approaches may be placed in sidewalk planter strips provided they meet the provisions in the Engineering Manual (EDSPM) and SDC 4.3.110.*

4.2.135 Sidewalks.

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(D) Planter strips are required as part of sidewalk construction. Planter strips must be at least 4½ feet wide (as measured from the back of curb to the edge of the sidewalk) and at least 4½ feet long. Planter strips must have approved landscaping consisting of street trees, and ground cover, and also may include Low Impact Development approaches allowed per in accordance with the

applicable provision in the *Engineering Design Standards and Procedures Manual* and SDC 4.3.110. Tree wells set in concrete or sidewalk areas must be a minimum of 4 feet by 4 feet. Concrete, asphalt, or other impermeable pavement are not allowed to substitute for landscaping within planter strips. Planter strips less than 4½ feet wide may be permitted when necessary for connectivity, safety, or to comply with street design requirements, subject to approval by the Director.

(E) Maintenance of sidewalks is the continuing obligation of the abutting property owner.

4.3.110 Stormwater Management.

Commentary: Amendments to 4.3.110(A) adds a definitions section, defines terms as required or recommended by the permit, and clarifies that definitions in this Section apply to the Stormwater Management section.

(A) **Definitions.** For the purposes of this section only, the following definitions apply. Additional definitions are provided in SDC 6.1.105 or SDC 6.1.110. Unless specifically defined below or in SDC 6.1.110, words or phrases used in this section shall be interpreted so as to give them the meaning they have in common usage.

(1) Maximum Extent Practicable (MEP) is the technology-based discharge standard for municipal separate storm sewer systems to reduce pollutants in stormwater discharges that was established by Section 402(p)(3)(B)(iii) of the Clean Water Act [33 U.S.C §1342(p)(3)(B)(iii)].

(2) Minimize means to reduce and/or eliminate to the extent achievable using control measures (including BMPs) that are technologically available, economically practicable, and achievable in light of best industry or municipal practices.

Commentary: *Amendments to 4.3.110(B) adds an Applicability section, complies with the language from the permit and existing code by requiring structural stormwater controls for 5,000 square feet or more of impervious surface, and requires a Stormwater Study for development that generates runoff from more than 1 acre of land or peak flows in excess of 0.5 cubic feet per second. The clause in 4.3.110(B)(1) that said "and discharges to the storm system" was removed from the draft code following feedback from Lane County staff. Not all development that creates or replaces 5,000 square feet or more of impervious surface area will discharge to the City's storm system; roughly 20% of all events will because there will still be rainfall events that produce more than 1.4" of rain. Therefore, to avoid confusion between the site performance standard and treatment standard in 4.3.110(C)(2), this clause was removed.*

(B) **Applicability.** The following development activities require the use of a site-specific stormwater management approach that incorporates one or more structural stormwater controls:

(1) Development that creates or replaces 5,000 square feet or more of impervious surface area ~~and discharges to the storm system~~;

(2) Development that disturbs one or more acres of land within the development area; and

(3) Development that generates peak flows in excess of 0.5 cubic feet per second within the development area.

Commentary: *Amendments to 4.3.110(C):*

- *Define the two types of performance standards for structural stormwater control facilities and comply with the MS4 Permit requirements.*
- *Stipulate that the stormwater system is separate from the sanitary sewer and that discharge of stormwater to the sanitary sewer system is prohibited.*
- *Require that all structural stormwater controls must be designed, operated, and maintained to comply with the Appendices in the Springfield Development Code or Engineering Manual.*
- *Move SDC 4.3.110(6) Identification of Water Quality Limited Watercourses and SDC 4.3.110(7) Protection of Riparian Area Functions to SDC 4.3.115 Water Quality Protection.*
- *Address permeable pavements, injection wells, on site source controls for high risk land uses (which previously resided in Chapter 3 of the EDSPM and is now in Appendix H of the SDC), and roof mounted equipment.*

(~~A~~ C) Stormwater ~~Management Improvements~~ Structural Controls – General Standards.

(1) **Engineered Design Requirement.** The Stormwater Study required under section 4.3.110(D) and ~~All stormwater management system design including~~ supporting documentation for the design of the proposed stormwater structural controls must be prepared and stamped by an Oregon licensed engineer.

~~**(2)** A stormwater management system must be installed to serve each new development within the city limits.~~

(2) **Technical Standards.** The Stormwater Study required under section 4.3.110(D) must demonstrate compliance with one of the following performance standards:

(a) Site Performance Standard: The first one and four tenths inches (1.4”) of rainfall from each storm event must be routed to one or more structural stormwater controls with sufficient capacity to fully infiltrate, evapotranspirate, and/or be reused on site without stormwater runoff discharging from the site; or

(b) Treatment Standard: All rainfall not retained onsite, up to the first one and four tenths inches (1.4”) of rainfall from each storm event, must be treated in compliance with the standards and design criteria in SDC 4.3.110(D).

~~(3)~~ ~~The stormwater management system must be designed and constructed in conformance with 4.3.110(C) - Stormwater Study Standards below.~~

(3 4) Discharge to Sanitary Sewer Prohibited. The stormwater management system must be separated from, and not discharge to, any public or private sanitary sewer system.

(4) Facility Design Standards. The structural stormwater controls must be designed, operated, and maintained consistent with the requirements in the facility-specific design requirements provided in Appendix D Typical Stormwater Facility Details. Unless an alternative is approved under the Treatment Standard, stormwater controls that include vegetative treatment must incorporate only those plant species listed in Appendix F.

(5) Construction Standards. ~~Any development that creates or replaces 5,000 square feet or more of impervious surface area and discharges to the storm system must install storm water controls that minimize the amount and rate of surface water runoff into the city stormwater system. The storm system~~ All stormwater structural controls must be constructed consistent with the *Engineering Design Standards and Procedures Manual* ~~sections 4.03.1, 4.03.2, and 4.03.4~~Chapter 4.

~~(6) Identification of Water Quality Limited Watercourses. The Director must maintain a Water Quality Limited Watercourses (WQLW) Map on file in the Development Services Department, which designates certain watercourses and their direct tributaries within the City and its urbanizing area. Any revision to the WQLW Map must be approved by the City Council as an amendment to this code. Those watercourses and their direct tributaries included on the WQLW Map have been found to warrant protective measures in support of the City's response to State and Federal regulations regarding surface and subsurface discharging stormwater management systems by satisfying the following standard:~~

~~(a) Water Quality Limited Watercourses (WQLW): Waters of the State that meet 1 or more of the following standards:~~

~~(i) Watercourse reaches, lying within the City and its urbanizing area, that are included by the State of Oregon Department of Environmental Quality (ODEQ) on its most recently adopted "303(d)" List of Impaired and Threatened Waterbodies.~~

~~(ii) Watercourse reaches, lying within the City and its urbanizing area, with significant water quality impairment identified by water quality monitoring and sampling done in accordance with approved quality assurance/quality control (QA/QC) protocols.~~

~~(b) A direct tributary to a WQLW that satisfies the following standards:~~

~~(i) Any watercourse that flows directly into a WQLW. However, watercourses that flow into the WQLW as a piped connection,~~

~~where the pipe system extends more than 200 feet upstream of the connection point are not considered as flowing into a WQLW under this standard.~~

~~**(ii)** Any watercourse that is a diversion from a WQLW and that discharges into either a WQLW or other direct tributary to a WQLW and where the water quality of the diverted flow at the discharge point has been degraded when compared with the water quality at the diversion point.~~

(6) **Permeable Pavements.** Permeable pavements may be used to reduce the area of impervious surfaces and shall be constructed consistent with the *Engineering Design Standards and Procedures Manual.* Permeable pavements cannot be used for treatment of stormwater from other impervious areas.

~~**(7)** **Protection of Riparian Area Functions.** A developer is required to employ site design, landscaping, and drainage management practices to protect, preserve, and restore the riparian area functions of the reaches of those watercourses shown on the WQLW Map that are contained within or abut the lot/parcel upon which the proposed development is located. For the purposes of this code, riparian area functions include, but are not limited to:~~

~~**(a)** Maintaining temperature;~~

~~**(b)** Maintaining channel stability;~~

~~**(c)** Providing flood storage;~~

~~**(d)** Providing groundwater recharge;~~

~~**(e)** Removing sediments;~~

~~**(f)** Reducing contaminants, for example: excess nutrients; oils and grease; metals; and fecal coliform;~~

~~**(g)** Moderating stormwater flows; and~~

~~**(h)** Providing fish and wildlife habitat.~~

(7) **Injection Wells.** Except where prohibited by this code, underground injection wells are allowed only with approval from the Department of Environmental Quality.

(8) **On Site Source Controls for High Risk Land Uses.** Where an application proposes one of the following high-risk uses, the application must comply with additional standards as provided in Appendix H On Site Source Controls:

(B) Site Uses and Characteristics That Trigger Source Controls
(C) Fuel Dispensing Facilities.
(D) Aboveground Storage of Liquid Materials.

(E) Solid Waste Storage Areas, Containers, and Trash Compactors.
(F) Outdoor Storage of Bulk Materials.
(G) Material Transfer Areas.
(H) Equipment and/or Vehicle Washing Facilities.
(I) Covered Vehicle Parking Structures.

(9) Roof-mounted Equipment. All rooftop mounted equipment shall be provided with secondary containment or a weather resistant enclosure to ensure that, in the event of a leak or spill, any fluids cannot migrate into a public or private stormwater system or to any underground injection control facilities.

Commentary: *Amendments to 4.3.110(D):*

- *Stipulate that a Type 2 application process is required when the Alternative Treatment Standard is proposed.*
- *Define the terms of technical infeasibility or site constraints for the Alternative Treatment Standard.*
- *Stipulate that all development must retain rainfall onsite to the maximum extent practicable and any rainfall not retained onsite, must treat up to the first one and four tenths inches (1.4") to achieve no less than 80% removal of total suspended solids. All stormwater not retained onsite must be discharged to the public stormwater system.*
- *Structural stormwater controls used to meet the Treatment Standard must incorporate Low Impact Development.*

(D) Treatment Standard – Criteria. The following provisions apply to review of an application that proposes to meet the Treatment Standard under SDC 4.3.110(C)(2)(a) above.

(1) Type 2 Review. An application that proposes to comply with the Alternative Treatment Standard must be reviewed through a Type 2 application process in accordance with SDC 5.1.400, except when proposed for a development that is subject to Type 3 review, in which case it may be approved through a Type 3 review.

(2) Applicability. An application that proposes to comply with the Alternative Treatment Standard must demonstrate that the Site Performance Standard cannot be retained and infiltrated on-site due to technical infeasibility or site constraints.

(a) Site constraints that may be used to demonstrate technical infeasibility under this subsection include but are not limited to shallow bedrock, high groundwater, protection of groundwater from contamination, soil instability as documented by geotechnical analysis required elsewhere by this Code, land use that is inconsistent with capture and infiltration of stormwater, the known presence of soil contamination, or constraints arising under the provisions of the Drinking Water Protection Overlay District in SDC 3.3.200.

(b) An applicant is not required to demonstrate that it is technically infeasible to evapotranspirate and/or reuse rainfall onsite to meet the Site Performance Standard.

(3) Design Standards.

(a) The development must retain rainfall onsite to the maximum extent practicable.

(b) All rainfall not retained onsite, up to the first one and four tenths inches (1.4") of rainfall from each storm event, must be treated to achieve:

(i) Reduction in the discharge of mercury, bacteria, and heavy metals to the maximum extent practicable; and

(ii) No less than 80% removal of total suspended solids (TSS) for typical influent concentrations ranging from 100-200 mg TSS per liter; or

(iii) For atypical influent concentrations less than 100 mg TSS/L or greater than 200 mg TSS/L, an alternative treatment standard may be required to target an equivalent water quality benefit as onsite retention.

(c) Detention ponds cannot be approved as a stand-alone treatment method and must be combined with Low Impact Development.

(d) All stormwater not retained on site must be discharged to the public stormwater system. Conveyances to the public stormwater systems must be designed to accommodate, at minimum, the peak runoff for the 25-year rainfall event for the entire tributary area. Exception: If the discharge of the runoff for the 25-year rainfall event is determined likely to exceed capacity of the public stormwater system or if said discharge would result in flooding, the conveyance must be designed to accommodate the peak runoff for the 100-year rainfall event.

(4) Low Impact Development (LID) Required. Structural stormwater controls used to meet the Treatment Standard must incorporate Low Impact Development (LID) as provided in Appendix D to the maximum extent practicable.

(5) Vegetation Standards.

(a) Trees that are required to be planted on-site under the provisions of this code must be planted to provide shade to the stormwater facility to the maximum extent practicable.

(b) Construction and planting must occur under conditions (such as temperature, moisture level, and handling) that prevent soil compaction and erosion. Any imported soil must be a sandy loam mixed with compost or a sand/soil/compost blend. Soil must be at least one-third compost by volume, be free-draining, and support plant growth. The compost must be derived from plant material; animal waste is not permitted.

Commentary: *SDC 4.3.110(E) clarifies that a Stormwater Study is required for any development that installs a structural stormwater control as defined in SDC 4.3.110(B) above. The Study must detail how the proposed stormwater control targets natural surface or predevelopment hydrologic function and provide a hydrological study map that meets the standards in 4.3.110(E)(2)(b).*

(~~B~~ E) Stormwater Study Standards.

(1) An applicant must complete a Stormwater Study~~, as outlined below, must be submitted for all developments that generate public and/or private stormwater runoff from more than one acre of land or generate peak flows in excess of 0.5 cfs. Applications for development that creates 5,000 square feet of new impervious surface or modifies an existing stormwater management system with a capacity of 0.5 cfs or greater must also include a complete Stormwater Study~~ for any development requiring the installation of structural stormwater controls as specified in SDC 4.3.110(B).

~~All developments containing or adjacent to a floodplain, stream, wetland, natural resource area, or wellhead protection zone must include in the submitted Stormwater Study a review and report on the impact to those.~~

(2) A Stormwater Study must include the following:

(a) A written narrative describing the proposed stormwater management ~~system~~ approach in detail, describing how the approach targets natural surface or predevelopment hydrologic function through the installation and long-term operation and maintenance of the proposed structural stormwater controls. ~~including connections to the public stormwater management system, a description addressing water quality measures (Best Management Practices) proposed, as well as any necessary capacity measures that may be required for development (i.e. – a detention pond) as determined by the Stormwater Study~~.

(b) A hydrological study map, that contains all of the following for ~~(i)~~ the development site and adjacent areas that contribute in excess of 0.1 cfs from offsite flows~~, well defined,~~ and an area beyond the development site of not less than 100 feet~~:~~;

(~~ii~~ i) Streets adjacent to or hydrologically connected to the development area, and street names;

(~~iii~~ ii) Flow arrows in streets and ditches;

(~~iv~~ iii) Contours or spot elevations for verification of direction of overland flow and pipe cover; Contour intervals on the study map must be as follows:

Slope (%)	Contour Interval (Feet)
0 - 10	2

11 - 25	5
> 25	10

(~~v~~ iv) Drainage areas of all sub-basins (in acres);

(~~vi~~ v) Collection points (nodes) at downstream limits of all sub-basins;

(~~vii~~ vi) A profile of the stormwater management system showing invert elevations, maintenance access hole top and bottom elevations, existing utilities, and existing and finished ground line elevations;

(~~viii~~ vii) Existing and proposed stormwater pipes and ~~channels~~ surface waters with sizes and/or cross-sections included;

(~~ix~~ viii) Future pipes in the system, complete with proposed sizes, slopes, pipe cover, and flow line elevations at maintenance access holes;

(~~x~~ ix) North arrow, scale, Engineer's name and contact information, and date;

(~~xi~~ x) Environmentally sensitive areas (e.g. gullies, ravines, swales, wetlands, steep slopes, springs, creeks, etc.) and direction of the flow of natural drainage features; ~~and~~

(~~xii~~ xi) 100-year flood plain with flood elevations, and 100-year flood way; and~~, as applicable.~~

(~~xii~~ xii) The location of all locally significant natural resource areas, Water Quality Limited Watercourses, or wellhead protection zones.

(c) A report describing development impacts to any floodplain or floodway.

(~~c~~ d) Hydrologic calculations to establish runoff volumes and peak flows ~~as provided in subsection (D) below~~.

(~~d~~ e) Hydraulic calculations to establish pipe size, flow velocity, and hydraulic grade line.

Commentary: *SDC 4.3.110(F) amends the stormwater study types to be either a Small Site Study or a Full Site Study (a Mid-Level Site Study was removed from the code). A Small Site Stormwater Study is permitted when a site is less than 1 acre, meets the site performance standard in 4.3.110(B)(2)(A), and does not contain or is abutting a floodplain/floodway, locally significant natural resource area, wetland, or riparian area; Water Quality Limited Watercourse, or well-head protection zone. For sites that cannot meet these standards, a Full Site Study is required.*

(~~C~~ F) Stormwater Study Types

(1) A Small Site Stormwater Study is required when all the following criteria are met:

(a) The proposed development is on a site that is less than ~~five~~ one acre~~s~~ in size ~~for a residential development, or is a commercial, industrial, or mixed-use development that is on a site that is one acre or less in size~~ and the onsite stormwater basin structural controls do not treat any single drainage basin larger than 15,000 square feet impervious area.

(b) The development meets the Site Performance Standard as provided in 4.3.110(C)(2)(A). ~~study area drains into an existing public stormwater management system with available capacity, as determined by testing performed by an Oregon licensed Engineer in conformance with the Eugene Stormwater Manual, for the peak flow based on the storm event frequency required under SDC 4.3.110(D)~~.

(c) The study area does not contain or is not abutting to any of the following: a floodplain or floodway, ~~stream, wetland,~~ locally significant natural resource area, wetland, or riparian area; or Water Quality Limited Watercourse. ~~or well head protection zone. Only locally significant resources that are on an adopted inventory or map, or resources that are adopted as part of the WQWL map are applicable under this standard.~~

~~**(2)** A Mid-Level Site Stormwater Study is required when the criteria for a Small Site Stormwater Study cannot be met and when ALL of the following criteria are met:~~

~~**(a)** The development area, including any hydraulically connected area on the same property, is less than 25 acres in size.~~

~~**(b)** The development area, including any hydraulically connected area on the same property, drains to an established public system within the city limits.~~

~~**(c)** The development area, including any hydraulically connected area on the same property, does not contain or is not adjacent to a floodplain, stream, wetland, natural resource area, or well head protection zone.~~

(~~3~~2) A Full Site Stormwater Study is required when the criteria for a Small Site ~~and Mid-Level Site~~ Stormwater Study cannot be met. ~~and where any of the following conditions are met:~~

~~**(a)** The development area, including any hydraulically connected area on the same property, is greater than 25 acres in size.~~

~~**(b)** Developments that require creation of a new outfall and/or the stormwater from the new development will exceed the existing stormwater management system capacity.~~

~~**(c)** The development area, including any hydraulically connected area on the same property, contains or is adjacent to a floodplain, stream, wetland, or natural resource area.~~

~~**(d)** Any development that generates a peak flow in excess of 0.5 cfs, modifies an existing stormwater management system with a capacity of~~

~~0.5 cfs or greater, or is a redevelopment or new development that creates 5,000 square feet or more of new impervious area.~~

Commentary: *SDC 4.3.110(G) amends the stormwater study hydrologic calculation standards for a small site stormwater study or a full site study. For a small site study, the calculations must demonstrate compliance with the Site Performance Standard (calculations must use a value of 1.4" over 24 hours) or the Treatment Standard (calculations must use an intensity of at least 0.13 in/hr for off line facilities and 0.22 in/hr for online facilities) and be supported by the methods and calculators in Chapter 4 of the Engineering Manual. For a full site study, the calculations must be supported by calculations using the unit hydrograph method and the storm event frequencies in Table 4.3.1.*

(~~D~~ G) Stormwater Study Hydrologic Calculation Standards. The stormwater study required under SDC 4.3.110(~~C~~ F) must be supported by hydrologic calculations that conform to the following standards:

(1) A small site stormwater study must be supported by hyrdrologic calculations using the rational method or a unit hydrograph method (as required for a full site stormwater study in (2) below. The rational peak flow method, Q=CiA, where 'Q' is the peak flow, 'C' is a runoff coefficient, 'i' is the rainfall intensity, and 'A' is the catchment area. Rainfall intensity and design storm requirements must be used as provided in 4.3-110(C)2~~, as follows:~~

~~**(a)** When the runoff coefficient 'C' is 0.5 or greater, the peak flow for impervious surfaces must be calculated separately from the pervious surfaces and compared to the peak flow of the combined area. The higher of the two peak flow rates must be used as the peak flow rate for the purpose of the stormwater study.~~

(a) To demonstrate compliance with the Site Performance Standard, calculations must use a value of 1.4" over 24 hours using the type 1a SCS storm intensity curve

~~**(b)** For the purposes of determining whether stormwater quality standards are met using the rational method, a rainfall intensity 'i' of 0.25 inch per hour must be used to calculate peak flow.~~

(b) To demonstrate compliance with the Treatment Standard, calculations must use an intensity of at least 0.13inch/hour for off line facilities and 0.22inch/hour for online facilities, up to the maximum extent practicable.

~~**(c)** For the purposes of determining stormwater capacity using the rational peak flow method, the rainfall intensity 'i' must be calculated using the Intensity Duration Frequency curves from the West Springfield Drainage Master Plan (1983) (available in Chapter 4 of the *Engineering Design Standards and Procedures Manual*). The storm event frequencies in SDC Table 4.3.1 must be used:~~

(c) A small site stormwater study that is supported by the methods and calculators provided in section 4.03.1 of the *Engineering Design*

Standards and Procedures Manual will be approved without requiring additional documentation or support for calculations.

Table 4.3.1 Storm Event Frequencies	
Peak Flow Range	Storm Event Frequency
<5 cfs	2-year storm event
5 cfs to <20 cfs	5-year storm event
20 cfs to <40 cfs	10-year storm event (1)
40 cfs and above	50-year storm event

(1) The 25-year storm event may be required when downstream capacity issues are identified during a Type 2 or Type 3 review process.

(2) A Mid-Level Site Stormwater Study and full site stormwater study must be supported by calculations using the unit hydrograph method.

(a) The Natural Resources Conservation Service (NRCS) SCS Type 1A distribution must be used (provided in the *Engineering Design Standards and Procedures Manual* for reference). The Storm Event Frequencies in Table 4.3.1 must be used.

Table 4.3.1 Storm Event Frequencies					
Recurrence Interval, Years	2	5	10	25	100
Flood Control, Destination: 24-Hour Depths, Inches	3.12	3.6	4.46	5.18	6.48
Water Quality Storm – Pollution reduction: 24-Hour Depths, 1.4 Inches					

(b) For the purposes of determining whether stormwater quality standards for mid-level and full sites, a rainfall intensity of 0.831.4 inches per 24-hour period must be used.

(c) A full site stormwater study must include floodplain analysis if the development will affect the floodplain. The 100-year flood storm event frequency must be used for development within the floodplain.

Commentary: *The Operations and Maintenance Requirements in the Engineering Manual were added to the code to ensure that all structural controls installed in compliance with the MS4 permit are operated and maintained to meet site performance or alternative treatment standards.*

(H) Operations and Maintenance Requirements.

(1) All structural stormwater controls must be operated and maintained to continue to meet the Site Performance Standard or alternative Treatment Standard as applicable.

(2) The owner of property subject to any application that proposes structural stormwater controls that will be privately-owned and operated must enter into an Operations and Maintenance Agreement with the City. The Agreement must specify at least the following:

(a) A plan to maintain and operate the structural stormwater controls to continue to meet the Site Performance Standard or alternative Treatment Standard, which may include but is not limited to operations and maintenance requirements in Appendix E.

(b) For structural stormwater controls that include vegetation, requirements to maintain and/or replace vegetation to ensure at least 90% vegetative coverage; and;

(c) For structural stormwater controls that include soils in the treatment process, requirements to maintain soil permeability and plant health; and

(d) Reporting requirements to document compliance with ongoing operations and maintenance requirements.

(3) For any property that is subject to an Operations and Maintenance Agreement, a Notice of Operations and Maintenance Agreement (NOMA) must be recorded with Lane County Deeds and Records. The NOMA must be in a form approved by the City, be sign by the property owner and properly notarized, and include a legal description of the subject property.

Commentary: *SDC 4.3.115 was amended to move SDC 4.3.110(6) Identification of Water Quality Limited Watercourses and SDC 4.3.110(7) Protection of Riparian Area Functions to this section for clarity and consistency. Clarification was provided to require site design, landscaping, and drainage management practices to protect, preserve, and restore riparian area functions.*

4.3.115 Water Quality Protection

(A) **Applicability.** These regulations apply water quality protection to only those sites that require Minimum Development Standards Review as specified in SDC 5.15.100, Site Plan Review approval as specified in SDC 5.17.100, and Land Divisions (Partition Tentative Plan and Subdivision Tentative Plan) approval as specified in SDC 5.12.100, or that disturb more than one acre of land through a Type 1 review. The following standards do not apply to single unit dwellings duplexes, or middle housing in the R-1 District that disturb less than one acre of land, unless as specified in SDC 4.3.115 (~~A~~B)(1). Existing buildings that are within the riparian areas specified in SDC 4.3.115(~~A~~B)(1) and (2) are not considered non-conforming. SDC 4.3-115(~~A~~B)(2)(a) and (b) provide additional protection from a non-conforming status.

(B) **Identification of Water Quality Limited Watercourses.** The Director must maintain a Water Quality Limited Watercourses (WQLW) Map on file in the Development Services

Department, which designates certain watercourses and their direct tributaries within the City and its urbanizing area. Any revision to the WQLW Map must be approved by the City Council as an amendment to this Code. Those watercourses and their direct tributaries included on the WQLW Map are Waters of the State that have been found to warrant protective measures in support of the City's response to State and federal regulations regarding surface and subsurface discharging stormwater management systems, by satisfying one or more of the following standards:

(1) Watercourse reaches, lying within the City and its urbanizing area, that are included by the State of Oregon Department of Environmental Quality (ODEQ) on its most recently adopted "303(d)" List of Impaired and Threatened Waterbodies.

(2) Watercourse reaches, lying within the City and its urbanizing area, with significant water quality impairment identified by water quality monitoring and sampling done in accordance with approved quality assurance/quality control (QA/QC) protocols.

(3) A direct tributary to a WQLW that satisfies the following standards:

(a) Any watercourse that flows directly into a WQLW. However, watercourses that flow into the WQLW as a piped connection, where the pipe system extends more than 200 feet upstream of the connection point are not considered as flowing into a WQLW under this standard.

(b) Any watercourse that is a diversion from a WQLW and that discharges into either a WQLW or other direct tributary to a WQLW and where the water quality of the diverted flow at the discharge point has been degraded when compared with the water quality at the diversion point.

(C) Protection of Riparian Area Functions. A developer is required to employ site design, landscaping, and drainage management practices to protect, preserve, and restore the riparian area functions of the reaches of those watercourses shown on the WQLW Map that are contained within or abut the lot/parcel upon which the proposed development is located.

(1) For the purposes of this Code, riparian area functions include, but are not limited to:

(a) Maintaining temperature;

(b) Maintaining channel stability;

(c) Providing flood storage;

(d) Providing groundwater recharge;

(e) Removing sediments;

(f) Reducing contaminants, for example: excess nutrients; oils and grease; metals; and fecal coliform;

(g) Moderating stormwater flows; and

(h) Providing fish and wildlife habitat.

(2) The following standards apply to the protection of water quality and protection of riparian area functions specified above:

(a) Avoid development or redevelopment in the following circumstances:

(i) Unsuitable areas, including, but not limited to, unstable slopes, wetlands and riparian areas;

(ii) Stream Crossings. Where crossings have to be provided, the impacts on water quality must be minimized to the maximum extent practical; and

(iii) Hardening or armoring of stream banks and shorelines.

(b) Prevent:

(i) Stormwater discharge impacts to water quality and quantity; and

(ii) Erosion and sediment run-off during and after construction.

(c) Protect:

(i) Riparian areas, buffers, and functions around all watercourses; and

(ii) Wetlands, wetland buffers and wetland functions.

(d) Preserve the hydrologic capacity of any watercourses.

(e) Utilize Native Vegetation in Riparian Areas. The required riparian area landscaping must be installed as part of the building permit process and may be bonded as specified in SDC 5.17.150.

(f) Restore and enhance riparian areas that are degraded in riparian function.

(3) In applying SDC 4.3.115(C)(2) above, riparian area protection, preservation, restoration, and enhancement measures must be applied as follows:

(a) For new development and redevelopment, existing riparian area functions must be protected and preserved. Degraded functions must be restored or enhanced through the full riparian area width, as specified in SDC 4.3.115(A)(1) and (2), and extending through the full frontage of the lot/parcel along the watercourse on the Water Quality Limited Watercourse (WQLW) Map.

(b) For additions and expansions on any portion of a lot/parcel, existing riparian area functions must be protected and preserved through the full riparian area width specified in SDC 4.3.115(A)(1) and (2), and extending through the full frontage of the lot/parcel along the watercourse on the WQLW Map.

(c) For additions and expansions within 100 feet of a watercourse on the WQLW Map on a lot/parcel that has degraded riparian functions, the area for restoration or enhancement must be based upon the ratio of the impervious area of the addition or expansion to the existing building or impervious area on the lot/parcel. The restoration or enhancement must start at the top of bank of the watercourse and work landward.

(~~A~~ D) Riparian Area Boundaries. When addressing criterion (E) as specified in SDC 5.12.125, for Land Divisions, and SDC 5.17.125 for Site Plan Review to protect riparian areas along watercourses shown on the Water Quality Limited Watercourses (WQLW) Map, the following riparian area boundaries must be utilized:

(1) Along all watercourses shown on the WQLW Map with average annual stream flow of 1,000 cubic feet per second (CFS) or greater, the riparian area boundary is 75 feet landward from the top of the bank. Existing native vegetative ground cover and trees must be preserved, conserved, and maintained between the ordinary low water line and the top of bank and 75 feet landward from the top of bank.

Within the Willamette Greenway, any change or intensification of use to a single unit dwelling or Middle Housing requires Site Plan Review as specified in SDC 3.3.315. through the Site Plan Review process the Director may reduce the size of the required riparian area if there is a finding that the proposed development is in compliance with SDC 3.3.300, the Willamette Greenway Overlay District, SDC 3.2.280 and other applicable provisions of this Code.

(2) Along all watercourses shown on the WQLW Map with average annual stream flow less than 1,000 CFS the riparian area boundary is 50 feet landward from the top of the bank. Existing native vegetative ground cover and trees must be preserved, conserved, and maintained both between the ordinary low water line and the top of bank and 50 feet landward from the top of bank.

(a) For all watercourses subject to Subsection 4.3.115(A)(2), other than the Mill Race or Cedar Creek, the 50-foot riparian area standard may be reduced to 35 feet, provided an equivalent amount and function of pervious land is established elsewhere on the property that utilizes water quality measures including, but not limited to: wetlands; bioswales; and additional trees, especially in parking areas, exclusive of otherwise required water quality measures and landscape areas. The applicant has the burden of proof to demonstrate, to the satisfaction of the Director, equivalency in relation to both the amount of pervious land (as specified above) and riparian area function (as specified in SDC 4.3.110(G)).

(b) An existing building within a riparian area is not considered a non-conforming use if destroyed by earthquake, flood or other natural disaster, or fire. In this case, the replacement building may be constructed within the same footprint as the existing building. If the building is within the Willamette Greenway, the standards in SDC 3.3.300, Willamette Greenway Overlay District apply.

(3) Where a watercourse divides a lot/parcel and the existing riparian area along that watercourse is degraded in riparian function, the applicant may relocate the watercourse to another portion of the property as approved by the Director and applicable State or Federal agency.

(~~B~~ E) Permitted Uses in Riparian Areas. The following uses are permitted in riparian areas as long as they do not diminish riparian functions:

(1) The planting of native trees and native vegetation to promote bank stability, enhance riparian areas, minimize erosion, preserve water quality and protect federally listed species. Trees may be clustered to allow the preservation of views; or to allow maintenance vehicles to approach City maintained stormwater facilities including detention basins, outfalls, culverts and similar stormwater facilities as may be permitted by the *Engineering Design Standards and Procedures Manual*.

(2) The felling of hazardous trees for safety reasons as specified in SDC 5.19.100, Tree Felling.

(3) Riparian area restoration and enhancement including the removal of invasive plant species, where necessary.

(4) Flood control structures, where necessary.

(5) Stormwater management systems and outfalls, as specified in the *Engineering Design Standards and Procedures Manual* or as required by other regulating authorities.

(6) Multi-use paths for pedestrian and/or bicycle use must be permitted, provided that the multi-use path drains away from the watercourse. Multi-use paths must be located along the outer edge of the required riparian area and away from the watercourse. The multi-use path must be located at the outermost edge of the 75-foot-wide Riparian Setback to the maximum extent practicable. Utilities may be extended within a multi-use path.

(7) Water-dependent or water-related uses between the Willamette River and the Greenway Setback Line as may be permitted in the Willamette Greenway Overlay District.

(8) Private driveways, public street crossings, bridges, and necessary culverts when there is no other vehicle access to the property. Crossings must be preferably at right angles to the watercourse. Public and private utilities must be permitted within the driveway, public street, or bridge right-of-way.

(9) Repair, replacement, or improvement of utility facilities as long as the riparian area is restored to its original condition.

(10) Routine repair and maintenance of existing structures, streets, driveways, utilities, accessory uses and other similar facilities.

(11) Other activities similar to those listed above that do not diminish riparian function. The Director must make the interpretations as specified in SDC 5.11.100.

~~(C) For protection of water quality and protection of riparian area functions as specified in SDC 4.3.110, the following standards apply:~~

~~(1) Avoid development or redevelopment in the following circumstances:~~

~~(a) Unsuitable areas, including, but not limited to, unstable slopes, wetlands and riparian areas;~~

~~(b) Stream Crossings. Where crossings have to be provided, the impacts on water quality must be minimized to the maximum extent practical; and~~

~~(c) Hardening or armoring of stream banks and shorelines.~~

~~(2) Prevent:~~

~~(a) Stormwater discharge impacts to water quality and quantity; and~~

~~(b) Erosion and sediment run-off during and after construction.~~

~~(3) Protect:~~

~~(a) Riparian areas, buffers, and functions around all watercourses; and~~

~~(b) Wetlands, wetland buffers and wetland functions.~~

~~(4) Preserve the hydrologic capacity of any watercourses.~~

~~(5) Utilize Native Vegetation in Riparian Areas. The required riparian area landscaping must be installed as part of the building permit process and may be bonded as specified in SDC 5.17.150.~~

~~(6) Restore and enhance riparian areas that are degraded in riparian function.~~

~~(7) In applying SDC 4.3.115(C)(1) through (6), riparian area protection, preservation, restoration, and enhancement measures must be applied as follows:~~

~~(a) For new development and redevelopment, existing riparian area functions must be protected and preserved. Degraded functions must be restored or enhanced through the full riparian area width, as specified in SDC 4.3.115(A)(1) and (2), and extending through the full frontage of the lot/parcel along the watercourse on the Water Quality Limited Watercourse (WQLW) Map.~~

~~(b) For additions and expansions on any portion of a lot/parcel, existing riparian area functions must be protected and preserved through the full riparian area width specified in SDC 4.3.115(A)(1) and (2), and extending through the full frontage of the lot/parcel along the watercourse on the WQLW Map.~~

~~(c) For additions and expansions within 100 feet of a watercourse on the WQLW Map on a lot/parcel that has degraded riparian functions, the area for restoration or enhancement must be based upon the ratio of the impervious area of the addition or expansion to the existing building or impervious area on the lot/parcel. The restoration or enhancement must start at the top of bank of the watercourse and work landward.~~

Commentary: *The recommendation to amend this section comes from the City of Springfield Stormwater Facilities Master Plan (2008) which proposed that the code be amended to add vegetated stormwater facilities in landscaping requirements. SDC 4.4.105 clarifies that Low Impact Development is a landscaping requirement and must be landscaped to comply with SDC 4.3.110(C) for review under the Treatment Standard. Where parking lot planting areas are required, Low Impact Development and vegetated structural stormwater controls may be used to meet that requirement.*

Note: Section 4.4.105(E) for Parking Lot landscaping are outside the scope of these Stormwater Post-Construction Requirements Update amendments but are provided for context and clarity.

4.4.100 - Landscaping, Screening, and Fence Standards

4.4.105 Landscaping.

(A) These regulations ensure that new development complies with the landscaping provisions of this code and any applicable Refinement Plans, Plan Districts, Master Plans, and Conceptual Development Plans; is adequately screened from less intensive development; considers the effects of vegetation on public facilities; retains significant clusters of natural trees and shrubs wherever possible; minimizes run-off, protects water quality and moderates temperature; facilitates energy conservation and crime prevention; and improves the appearance of the City to create a desirable place to live and work.

(B) ~~Three~~ Four types of landscaping may be required:

(1) Landscaping standards for private property as specified in this section and other sections of this code.

(2) Street trees in the public right-of-way as specified in SDC 4.2.140.

(3) Curbside planter strips in the public right-of-way as specified in SDC 4.2.135.

(4) Low Impact Development as specified in SDC 4.3.110(C) for review under the Treatment Standard.

~~**(C)** Materials and installation costs of required planting and irrigation, other than what is required by the Minimum Development Standards, SDC 5.15.100, must not exceed 10 percent of the value of the new development, including the cost of parking facilities.~~

(C) The following areas of a lot/parcel must be landscaped, unless otherwise specified in this code:

(1) All required setback areas and any additional planting areas as specified in the appropriate zoning district.

(2) Parking lot planting areas required in this section.

(3) Low Impact Development as specified in SDC 4.3.110(C) for review under the Treatment Standard.

(~~E~~ D) At least 65 percent of each required planting area listed in Subsection (D) above must be covered with living plant materials within 5 years of the date of installation, unless a higher standard applies elsewhere in this code. The living plant materials must be distributed throughout the required planting area. The planting acceptable per 1,000 square feet of required planting area is as follows:

(1) A minimum of 2 trees, not less than 6 feet in height, that are at least a 2 inch (dbh) caliper (at the time of planting, not including root ball); and

(2) Ten shrubs, 5 gallons or larger.

(3) Lawn and/or groundcover may be substituted for up to 25 percent of the living plant material requirement, unless trees or shrubbery are required for screening. This substitution is only allowed when the applicant has demonstrated that there ~~is~~ are provisions for ongoing maintenance of the landscape areas.

These standards do not apply to single unit detached dwellings and middle housing in the R-1 District.

(~~F~~ E) Parking Lots. ~~Parking lot planting areas must include 1 canopy tree at least 2 inches (dbh) in caliper that meets City street tree standards as may be permitted by the *Engineering Design Standards and Procedures Manual* and at least 4 shrubs, 5 gallon or larger, for each 100 square feet of planting area. Shrubs that abut public right-of-way or that is placed in the interior of any parking lot must not exceed 2.5 feet in height at maturity.~~

(1) The following Pparking lot planting areas must be landscaped in accordance with the standards in (2) below include:

(~~1~~a) Parking and driveway setback areas specified in the applicable land use district; and

(~~2~~b) Five percent of the interior of a parking lot, exclusive of any required parking setbacks, if 24 or more parking spaces are located between the street side of a building and an arterial or collector street and are visible from any street.

(~~3~~c) See also SDC 4.7.380 or 4.7.385 for multiple unit housing design standards.

(2) Parking lot planting areas must include at least 4 shrubs, 5 gallon or larger, for each 100 square feet of planting area. Any shrubs that abut public right-of-way or that is placed in the interior of any parking lot must not exceed 2.5 feet in height at maturity. Where parking lot planting areas are required, Low Impact Development and vegetated structural stormwater controls may be used to meet this requirement. Shrubs provided within a structural stormwater control may not be counted toward meeting this criterion.

(3~~2~~) Small Parking Lots and Modifications to Existing Parking Lots. Planting areas for developments with one-half acre or less of new surface parking lot area must include 1 canopy tree at least 2 inches (dbh) in caliper, for each 100 square feet of parking lot planting area. Trees must meet City street tree standards in the City of Springfield Street Tree list in Appendix G for the appropriately sized planter area.

(4) Large Parking Lots. Developments that include more than one-half acre of surface parking lot area must comply with the following:

(a) Developments not required to comply with OAR 330-135-0010 must provide a climate mitigation action including at least one of the following:

(i) Payment of at least $1500 per new parking space into a fund at the Oregon Department of Energy dedicated to equitable solar or wind energy development; or

(ii~~i~~) Tree canopy covering at least 40% of the new parking lot area at maturity but no more than 15 years after planting; or

(iii) If parking is provided for a non-residential use, the development may include a mixture of (i) and (ii) – providing between 30% and 40% tree canopy and paying for a proportionate percentage of parking spaces.

(b) Developments must provide either trees along driveways or a minimum of 30% tree canopy coverage over parking areas. Developments are not required to provide trees along drive aisles.

(c) The tree spacing and species planted must be designed to maintain a continuous canopy, except when interrupted by driveways, drive aisles, and other site design considerations. Trees that are provided in compliance with (4)(a)(ii) above meet this standard.

(d) Trees must meet City street tree standards as specified in City of Springfield Street Tree list in Appendix G for the appropriately sized planter area.

~~(e)~~ Development of a tree canopy under subsections (a) and (b) must be done in coordination with the local electric utility, including pre-design, building, and maintenance phases.

~~(f)~~ Applicant must provide a certification provided by a certified arborist with an Oregon Landscape Contractor license that trees planted to meet subsections (1) and (2) will be planted to meet or exceed the 2021 American National Standards Institute A300 standards.

~~(G~~ F) All new required planting areas must be provided with a permanent irrigation system which can include a drip irrigation system. Areas planted with noninvasive drought tolerant species or plant communities are exempt from this standard.

~~(H~~ G) Landscaped setbacks abutting required screening on the same property are exempted from planting requirements if the area is not visible from any public right-of-way or adjacent property.

~~(I~~ H) **Planting Installation Standards.**

(1) Existing landscaping to be retained must be provided with protection which will remain through the construction process. The plants to be saved and the method of protection must be noted on the Landscape Plan.

(2) Existing trees to be retained on private property must not have construction occur within the drip line, unless a landscape architect certifies that affected trees will not have at least a 90 percent chance of survival over a 5-year period. Trees to be retained must be provided with protection with at least a 3-foot-tall temporary fence barrier around the drip line and include protection around the tree to prevent abrasion to the tree. The trees to be retained and the method of protection must be included on the Landscape Plan.

(3) The Landscape Plan must include specifications for topsoil, including depth and organic matter requirements, to ensure the health and vitality of required planting. Where planting areas have been excavated the replacement of topsoil must be provided for and indicated on the Landscape Plan. All waste material must be removed from required planting areas prior to the application of topsoil.

(a) Inspection may be made by the Director prior to planting to verify proper rough grade and installation of irrigation systems.

(b) Plant materials and soil preparation may be inspected prior to or in conjunction with the occupancy inspection to ensure that placement, quantity, size, and variety conform to the approved Planting Plan and the requirements of this section. Nursery tags identifying variety and species must remain on plant specimens until the Final Building Inspection by the Building Official or the issuance of a Certificate of Occupancy. (6443)

(4) Landscaping and vegetation within structural stormwater controls, including Low Impact Development, must meet the maintenance requirements in SDC 4.3.110(F).

Commentary: *The recommendation to amend this section comes from the City of Springfield Stormwater Facilities Master Plan (2008) which proposed that the code be amended to allow curb cuts to allow runoff from stormwater quality facilities in parking lot landscaping.*

4.6.120 Motor Vehicle Parking—Parking Lot Improvements.

All parking areas must conform to the setback, vision clearance, planting, and screening provisions of this code and must be completed prior to occupancy. Required parking spaces must be improved as follows:

****

(C) All parking spaces fronting a sidewalk, alley, street, landscaped area, or structure must be provided with a secured wheel bumper or linear curb not less than 6 inches in height to be set back from the front of the stall a minimum of 2 feet to allow for vehicle encroachment. Wheel bumpers must be a minimum of 6 feet in length. Curbs must be constructed in conformance with the Standard Construction Specifications. the curb into the landscape area. Curbs separating landscaped areas from parking areas must allow stormwater runoff to pass through, as provided in APWA detail drawing RD RD700 &701.

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Commentary: *The recommendation to amend this section comes from the City of Springfield Stormwater Facilities Master Plan (2008) which proposed that the code be amended to require review for stormwater management requirements or additions and expansions of impervious areas.*

5.17.100 - Site Plan Review

5.17.110 Applicability.

(A) The Site Plan Review process is used for:

(1) The following categories of multiple unit housing, commercial, public and semi-public, and industrial development or uses, including construction of impervious surfaces for parking lots, ~~and~~ storage areas, and stormwater improvements:

(a) New development on vacant sites and redevelopment, except:

(i) Where a proposed development qualifies for a Minimum Development Standards review in accordance with SDC 5.15;

(ii) Where multiple unit housing qualifies for a Type 1 process as specified in SDC 4.7.380.

(b) Additions or expansions that exceed either 50 percent of the existing building gross floor area or 5,000 square feet or more of new building gross floor area and/or impervious surface area, except where a

proposed development qualifies for a Minimum Development Standards review according to SDC 5.15;

(c) Additions, expansions, and changes of use, regardless of size or intervening use, that:

(i) Contain or are within 150 feet of the top of bank (as measured from the property line of the subject property) of any Water Quality Limited Watercourses (WQLW) identified on the WQLW Map on file in the Development ~~Services~~ and Public Works Department;

(ii) Contain or are within 100 feet of the top of bank (as measured from the property line of the subject property) of any direct tributaries of WQLW identified on the WQLW Map on file in the Development ~~Services~~ and Public Works Department;

(iii) Are located within the City's urbanizable area, outside of the city limits; or

(iv) Are located within 50 feet of property in a residential land use district or residentially designated land (as measured from the property line of the subject property); or

(v) Proposes review under the Treatment Standard in SDC 4.3.110(B)-(C) to demonstrate compliance with applicable stormwater treatment standards.

(d) Discretionary Uses, except where a proposed development qualifies for a Minimum Development Standards review in accordance with SDC 5.15; and

(e) Any uses listed in the applicable land use district, overlay, or plan district, which specifically require Site Plan Review.

****

Commentary: *Definitions are provided to SDC 6.1.110 to clarify stormwater terms.*

6.1.100 – Definitions

6.1.110 Meaning of Specific Words and Terms.

Evapotranspiration. The sum of evaporation and transpiration of water from the earth's surface to the atmosphere. Includes the evaporation of liquid or solid water plus transpiration from plants (the release of water vapor into the atmosphere through plant stomata or pores).

~~**Impervious Surface.** Any surface that either prevents or delays the infiltration of water into the soil as it entered under natural conditions preexistent to development, and/or a surface area that causes water to run off the surface in greater quantities or at an increased rate of flow than prior to development. Common impervious surfaces include: building roofs; traditional concrete or~~

~~asphalt paving on walkways, driveways, parking lots, gravel lots and roads; and heavily compacted earthen materials.~~

Impervious Surface. Any surface resulting from development activities that prevents the infiltration of water. Common impervious surfaces include: building roofs; traditional concrete or asphalt paving on walkways, driveways, parking lots, gravel lots and roads; and heavily compacted earthen materials.

Low Impact Development (LID). A stormwater management approach that seeks to mitigate the impacts of increased runoff and stormwater pollution using a set of planning, design, and construction approaches and stormwater management practices that promote the use of natural systems for infiltration, evapotranspiration, and reuse of rainwater, and can occur at a wide range of landscape scales (i.e., regional, community, and site). Low impact development is a comprehensive land planning and engineering design approach to stormwater management with a goal of mimicking the pre-development hydrologic regime of urban and developing watersheds.

Off-line Stormwater Facilities. Facilities that are sized for only the water quality storm and in which higher stormwater flows are bypassed around the treatment area. These facilities typically require an inlet control structure and typically include mechanical treatment facilities.

On-line Stormwater Facilities. Facilities in which stormwater flows are routed through the treatment area, so high flows are not bypassed around the facility, such as vegetated swales and most vegetated treatment facilities.

Predevelopment Hydrologic Function. The hydrology of a site reflecting the local rainfall patterns, soil characteristics, land cover, evapotranspiration, and topography. The term predevelopment as used in predevelopment hydrologic function is consistent with the term predevelopment as discussed in Federal Register Volume 64, Number 235 and refers to the runoff conditions that exist onsite immediately before the planned development activities occur. Predevelopment is not intended to be interpreted as the period before any human-induced land disturbance has occurred.

Storm Event. A precipitation event that results in surface runoff. For modeling purposes in the City of Springfield this is a Type 1a storm of 24-hour duration.

~~**Stormwater.** Water derived from a storm event or conveyed through a storm sewer water management system.~~

Stormwater or Stormwater Runoff. That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, channels, or pipes into a defined surface water channel or a constructed infiltration facility. It includes snow melt runoff and surface runoff and drainage.

Structural Stormwater Controls. Stormwater controls that are physically designed, installed, and maintained to prevent or reduce the discharge of pollutants in stormwater to minimize the impacts of stormwater on waterbodies. Examples of structural stormwater controls or Best Management Practices (BMPs) include: (1) storage practices such as wet ponds and extended-

detention outlet structures; (2) filtration practices such as grassed swales, sand filters and filter strips; and, (3) infiltration practices such as infiltration basins and infiltration trenches.

Total Maximum Daily Loadings (TMDL). The calculated pollutant amount that a water body can receive and still meet Oregon water quality standards. The TMDL program evaluates and sets pollutant loads to impaired waterbodies and designates management agencies to implement water quality improvement plans.

Total Suspended Solids (TSS). The ratio of the weight of solid residue in a filtered sample to the volume of the sample, where the residue is obtained by filtering the sample through a 0.45 µm filter.

APPENDIX B

SANTA BARBARA URBAN HYDROGRAPHY METHOD

(A) Overview

(1) The Santa Barbara Urban Hydrograph (SBUH) method was developed by the Santa Barbara County Flood Control and Water Conservation District to determine a runoff hydrograph for an urbanized area.

(B) Elements Of the Santa Barbara Urban Hydrograph (SBUH) Method

(1) The SBUH method depends on several variables:

(a) Pervious (A_p) and impervious (A_{imp}) land areas

(b) Time of concentration (T_c) calculations

(c) Runoff curve numbers (CN) applicable to the site

(d) Design storm

(C) Land Area

(1) The total area, including the pervious and impervious areas within a drainage basin, shall be quantified in order to evaluate critical contributing areas and the resulting site runoff.

(2) Each area within a basin shall be analyzed separately and their hydrographs combined to determine the total basin hydrograph.

(3) Areas shall be selected to represent homogenous land use/development units.

(D) Time of Concentration

(1) Time of concentration, T_c, is the time for a theoretical drop of water to travel from the furthest point in the drainage basin to the facility being designed. (In this case, T_c is derived by calculating the overland flow time of concentration and the channelized flow time of concentration.) T_c depends on several factors, including

ground slope, ground roughness, and distance of flow. The following formula for determining Tc is:

(a) Formulas

(i) $T_c = T_{t1} + T_{c2} + T_{c3} + \ldots + T_{cn}$

(ii) $T_t = L/60V$ (Conversion of velocity to travel time)

(iii) $T_t = (0.42\ (nL)^{0.8})/(158(s)^{0.4})$ (Manning's kinematic solution for sheet flow less than 300 feet)

(b) Shallow concentrated flow for slopes less than 0.005 ft/ft.:

(i) $V = 16.1345(s)^{0.5}$ (Unpaved surfaces)

(ii) $V = 20.3282(s)^{0.5}$ (Paved surfaces)

(c) Where,

(i) Tt = travel time, minutes

(ii) Tc = total time of concentration, minutes (minimum Tc = 5 minutes)

(iii) L = flow length, feet

(iv) V = average velocity of flow, feet per second

(v) n = Manning's roughness coefficient for various surfaces

(vi) s = slope of the hydraulic grade line (land or watercourse slope), feet per foot

(d) When calculating T_c, the following limitations apply:

(i) Overland sheet flow (flow across flat areas that does not form into channels or rivulets) shall not extend for more than 300 feet.

(ii) For flow paths through closed conveyance facilities such as pipes and culverts, standard hydraulic formulas shall be used for establishing velocity and travel time.

(iii) Flow paths through lakes or wetlands may be assumed to be zero (i.e., $T_c = 0$).

(E) Runoff Curve Numbers

(1) The runoff curve numbers approved for water quantity/quality calculations are included as Table C-2 of this appendix.

(2) The curve numbers presented in Table C-2 are for wet antecedent moisture conditions. Wet conditions assume previous rainstorms have reduced the capacity of soil to absorb water. Given the frequency of rainstorms in this area, wet conditions are most likely and give conservative hydrographic values.

(F) Design Storm

(1) The SBUH method also requires a design storm to perform the runoff calculations. For flow control calculations, use NRCS Type 1A 24-hour storm distribution. This storm is shown in Figure C-1 and Table C-4. The depth of rainfall for the 2 through 100-year storm events is shown below in Table C-1.

Table C-1
24-HOUR RAINFALL DEPTHS

Recurrence Interval, Years	2	5	10	25	100
Flood Control, Destination: 24-Hour Depths, Inches	3.12	3.6	4.46	5.18	6.48
Water Quality Storm – Pollution reduction: 24-Hour Depths, 1.4 Inches					

Table C-2 Runoff Curve Numbers					
Cover description		**Curve numbers for hydrologic soil group**			
Cover type	**Hydrologic condition**	**A**	**B**	**C**	**D**
Runoff curve numbers for urban areas*					
Open space (lawns, parks, golf courses, cemeteries, etc.):					
Grass cover <50%		68	79	86	89
Grass cover 50% to 75%)		49	69	79	84
Grass cover > 75%		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way) Urban districts:		72	82	87	89
Urban districts:					
Commercial and business		89	92	94	95
Industrial		81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)		77	85	90	92
1/4 acre		61	75	83	87
1/3 acre		57	72	81	86
1/2 acre		54	70	80	85
1 acre		51	68	79	84
2 acres		46	65	77	82
Runoff curve numbers for other agricultural lands*					
Pasture, grassland, or range-continuous forage for grazing					
<50% ground cover or heavily grazed	Poor	68	79	86	89

with no mulch					
50 to 75% ground cover and not heavily grazed	Fair	49	69	79	84
>75% ground cover and lightly or only occasionally grazed	Good	39	61	74	80
Meadow-continuous grass, protected from grazing and generally mowed for hay	-	30	58	71	78
<50% ground cover	Poor	48	67	77	83
50 to 75% ground cover	Fair	35	56	70	77
>75% ground cover	Good	30	48	65	73
Woods-grass combination (orchard or tree farm)	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods					
Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.	Poor	45	66	77	83
Woods are grazed but not burned, and some forest litter covers the soil.	Fair	36	60	73	79
Woods are protected from grazing, and litter and brush adequately cover the soil.	Good	30	55	70	77
Runoff curve numbers for Simplified Approaches**					
Eco-roof	Good	n/a	61	n/a	n/a
Roof Garden	Good	n/a	48	n/a	n/a
Contained Planter Box	Good	n/a	48	n/a	n/a
Infiltration & Flow-Through Planter Box	Good	n/a	48	n/a	n/a
Pervious Pavement	-	76	85	89	n/a
Trees					
New and/or Existing Evergreen	-	36	60	73	79
New and/or Existing	-	36	60	73	79
Deciduous					

n/a - Does not apply, as design criteria for the relevant mitigation measures do not include

the use of this soil type.
*Soil Conservation Service, *Urban Hydrology for Small Watersheds*, Technical Release 55, pp. 2.5-2.8, June 1986.
**CNs of various cover types were assigned to the Proposed Simplified Approaches with similar cover types as follows:

Eco-roof – assumed grass in good condition with soil type B.
Roof Garden – assumed brush-weed-grass mixture with >75% ground cover and soil type B. Contained Planter Box – assumed brush-weed-grass mixture with >75% ground cover and soil type B.
Infiltration & Flow-Through Planter Box – assumed brush-weed-grass mixture with >75% ground cover and soil type B.
Pervious Pavement – assumed gravel.
Trees – assumed woods with fair hydrologic conditions.

Note: To determine hydrologic soil type, consult local USDA Soil Conservation Service Soil Survey.

Table C-3
NRCS Hydrologic Soil Group Descriptions

NRCS Hydrologic Soil Group	**Description**
Group A	Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist chiefly of deep, well drained to excessively drained sands or gravels. These soils have a high rate of water transmission.
Group B	Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.
Group C	Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils that have a layer that impedes the downward movement of water or soils that have a moderately fine texture. These soils have a slow rate of water transmission.
Group D	Soils having a very slow infiltrate rate (high runoff potential) when thoroughly wet. These consist chiefly of clay soils that have a high shrink-swell position, soils that have a permanent high water table, soils that have a fragipan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

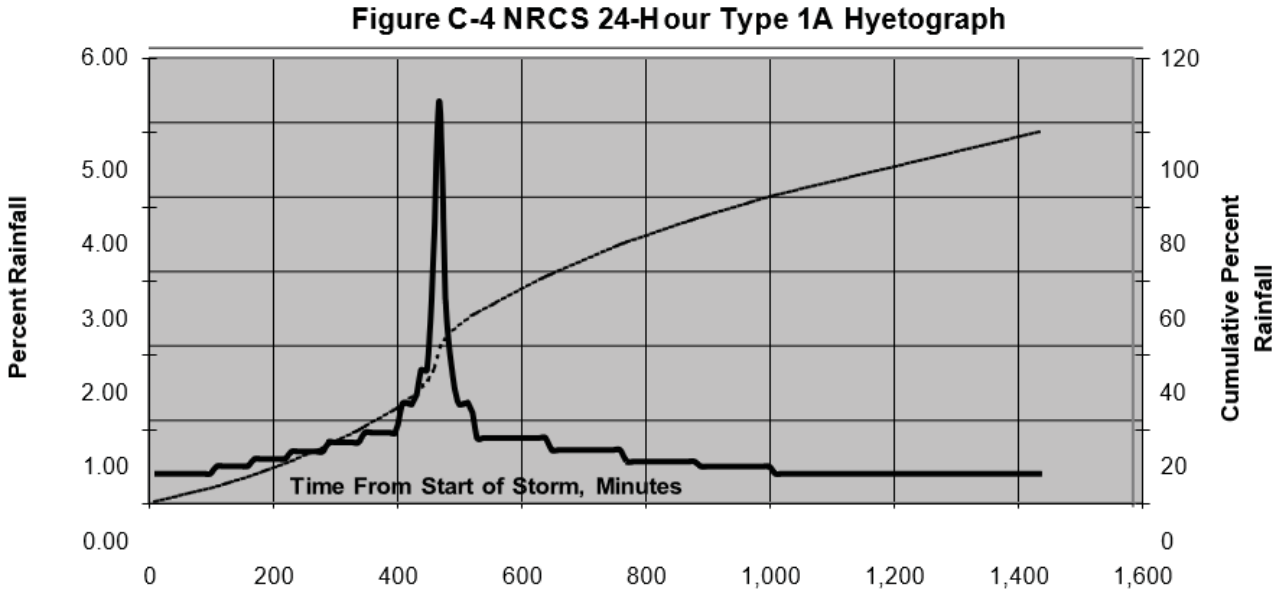


Figure C-4 NRCS 24-Hour Type 1A Hyetograph
Percent Rainfall
Cumulative Percent Rainfall
Time From Start of Storm, Minutes
6.00
5.00
4.00
3.00
2.00
1.00
0.00
120
100
80
60
40
20
0
0
200
400
600
800
1,000
1,200
1,400
1,600

Table C-5 NRCS Type 1A Hyetographic Distribution - For Use In Water Quality/Quantity Design

Time From Start of Storm, Minutes		% Rainfall	Cumulative % Rainfall	Time From Start of Storm, Minutes		% Rainfall	Cumulative % Rainfall	Time From Start of Storm, Minutes		% Rainfall	Cumulative % Rainfall	Time From Start of Storm, Minutes		% Rainfall	Cumulative % Rainfall
0 -	10	0.40	0.40	360 -	370	0.95	22.57	720 -	730	0.72	67.40	1080 -	1090	0.40	86.00
10 -	20	0.40	0.80	370 -	380	0.95	23.52	730 -	740	0.72	68.12	1090 -	1100	0.40	86.40
20 -	30	0.40	1.20	380 -	390	0.95	24.47	740 -	750	0.72	68.84	1100 -	1110	0.40	86.80
30 -	40	0.40	1.60	390 -	400	0.95	25.42	750 -	760	0.72	69.56	1110 -	1120	0.40	87.20
40 -	50	0.40	2.00	400 -	410	1.34	26.76	760 -	770	0.57	70.13	1120 -	1130	0.40	87.60
50 -	60	0.40	2.40	410 -	420	1.34	28.10	770 -	780	0.57	70.70	1130 -	1140	0.40	88.00
60 -	70	0.40	2.80	420 -	430	1.34	29.44	780 -	790	0.57	71.27	1140 -	1150	0.40	88.40
70 -	80	0.40	3.20	430 -	440	1.80	31.24	790 -	800	0.57	71.84	1150 -	1160	0.40	88.80
80 -	90	0.40	3.60	440 -	450	1.80	33.04	800 -	810	0.57	72.41	1160 -	1170	0.40	89.20
90 -	100	0.40	4.00	450 -	460	3.40	36.44	810 -	820	0.57	72.98	1170 -	1180	0.40	89.60
100 -	110	0.50	4.50	460 -	470	5.40	41.84	820 -	830	0.57	73.55	1180 -	1190	0.40	90.00
110 -	120	0.50	5.00	470 -	480	2.70	44.54	830 -	840	0.57	74.12	1190 -	1200	0.40	90.40
120 -	130	0.50	5.50	480 -	490	1.80	46.34	840 -	850	0.57	74.69	1200 -	1210	0.40	90.80
130 -	140	0.50	6.00	490 -	500	1.34	47.68	850 -	860	0.57	75.26	1210 -	1220	0.40	91.20
140 -	150	0.50	6.50	500 -	510	1.34	49.02	860 -	870	0.57	75.83	1220 -	1230	0.40	91.60
150 -	160	0.50	7.00	510 -	520	1.34	50.36	870 -	880	0.57	76.40	1230 -	1240	0.40	92.00
160 -	170	0.60	7.60	520 -	530	0.88	51.24	880 -	890	0.50	76.90	1240 -	1250	0.40	92.40
170 -	180	0.60	8.20	530 -	540	0.88	52.12	890 -	900	0.50	77.40	1250 -	1260	0.40	92.80
180 -	190	0.60	8.80	540 -	550	0.88	53.00	900 -	910	0.50	77.90	1260 -	1270	0.40	93.20
190 -	200	0.60	9.40	550 -	560	0.88	53.88	910 -	920	0.50	78.40	1270 -	1280	0.40	93.60
200 -	210	0.60	10.00	560 -	570	0.88	54.76	920 -	930	0.50	78.90	1280 -	1290	0.40	94.00
210 -	220	0.60	10.60	570 -	580	0.88	55.64	930 -	940	0.50	79.40	1290 -	1300	0.40	94.40
220 -	230	0.70	11.30	580 -	590	0.88	56.52	940 -	950	0.50	79.90	1300 -	1310	0.40	94.80
230 -	240	0.70	12.00	590 -	600	0.88	57.40	950 -	960	0.50	80.40	1310 -	1320	0.40	95.20
240 -	250	0.70	12.70	600 -	610	0.88	58.28	960 -	970	0.50	80.90	1320 -	1330	0.40	95.60
250 -	260	0.70	13.40	610 -	620	0.88	59.16	970 -	980	0.50	81.40	1330 -	1340	0.40	96.00
260 -	270	0.70	14.10	620 -	630	0.88	60.04	980 -	990	0.50	81.90	1340 -	1350	0.40	96.40
270 -	280	0.70	14.80	630 -	640	0.88	60.92	990 -	1000	0.50	82.40	1350 -	1360	0.40	96.80
280 -	290	0.82	15.62	640 -	650	0.72	61.64	1000 -	1010	0.40	82.80	1360 -	1370	0.40	97.20
290 -	300	0.82	16.44	650 -	660	0.72	62.36	1010 -	1020	0.40	83.20	1370 -	1380	0.40	97.60
300 -	310	0.82	17.26	660 -	670	0.72	63.08	1020 -	1030	0.40	83.60	1380 -	1390	0.40	98.00
310 -	320	0.82	18.08	670 -	680	0.72	63.80	1030 -	1040	0.40	84.00	1390 -	1400	0.40	98.40
320 -	330	0.82	18.90	680 -	690	0.72	64.52	1040 -	1050	0.40	84.40	1400 -	1410	0.40	98.80
330 -	340	0.82	19.72	690 -	700	0.72	65.24	1050 -	1060	0.40	84.80	1410 -	1420	0.40	99.20
340 -	350	0.95	20.67	700 -	710	0.72	65.96	1060 -	1070	0.40	85.20	1420 -	1430	0.40	99.60
350 -	360	0.95	21.62	710 -	720	0.72	66.68	1070 -	1080	0.40	85.60	1430 -	1440	0.40	100.00

APPENDIX C
INFILTRATION TESTING

(A) Applicability

(1) To properly size and locate stormwater management facilities, it is necessary to characterize the soil infiltration conditions at the location of the proposed facility. All projects that propose onsite infiltration must evaluate existing site conditions and determine:

(a) If the infiltration rate is adequate to support the proposed stormwater management facility (satisfied through presence of mapped NRCS Type A & B Soils or the Simplified Approach infiltration test) or;

(b) The design infiltration rate prior to facility design (satisfied through the Presumptive Approach infiltration testing conducted by a qualified professional).

The following sections provide the approved standard infiltration testing specifications.

(B) Simplified Approach Open Pit Infiltration Test

(1) The purpose of the Simplified Approach is to provide a method which can be conducted by a nonprofessional for design of simple stormwater systems on small projects.

(2) The Simplified Approach open pit test is applicable only to projects on private property with less than 15,000 square feet of new or redeveloped impervious area.

(a) The results of infiltration testing must be documented on the Simplified Approach Form.

(b) The Simplified Approach cannot be used to find a design infiltration rate.

(c) The intent of the open pit test is to determine whether or not the local infiltration rate is adequate (2 inches/hour or greater) for the predesigned stormwater facilities described in Appendix F of the EDSPM(Infiltration swales, basins, planters, drywells, and trenches).

(d) The Simplified Approach Infiltration Test does not need to be conducted by a licensed professional.

(C) Simplified Approach Procedure

(1) A simple open pit infiltration test is required for each facility designed through the Simplified Approach. The test should be where the facility is proposed or within the immediate vicinity.

(a) Excavate a test hole to the depth of the bottom of the infiltration system, or otherwise to 4 feet.

(i) The test hole can be excavated with small excavation equipment or by hand using a shovel, auger, or post hole digger.

(ii) If a layer hard enough to prevent further excavation is encountered, or if noticeable moisture/water is encountered in the soil, stop and measure this depth from the surface and record it on the Simplified Approach Form. Proceed with the test at this depth.

(iii) Fill the hole with water to a height of about 6 inches from the bottom of the hole, and record the exact time. Check the water level at regular intervals (every 1 minute for fast draining soils to every 10 minutes for slower-draining soils) for a minimum of 1 hour or until all of the water has infiltrated. Record the distance the water has dropped from the top edge of the hole.

(iv) Repeat this process two more times, for a total of three rounds of testing.

(v) These tests should be performed as close together as possible to accurately portray the soil's ability to infiltrate at different levels of saturation. The third test provides the best measure of the saturated infiltration rate.

(b) For each test pit required, submit all three testing results with the date, duration, drop in water height, and conversion into inches per hour.

(c) If the results of the Simplified Approach open pit test show an infiltration rate greater than 2.0 inches per hour, the applicant can proceed with Simplified Approach facility design (where applicable).

(d) If the applicant would like to use an infiltration rate for design purposes, a Presumptive Infiltration Test must be conducted.

(D) Presumptive Infiltration Testing

(1) The Presumptive Approach must be used for all public and private developments where the Simplified Approach is not applicable.

(2) The qualified professional must exercise judgment in the selection of the infiltration test method.

(3) The three infiltration available testing methods used to determine a design infiltration rate are:

(a) Open pit falling head;

(b) Encased falling head; or

(c) Double-ring infiltrometer.

(4) Where satisfactory data from adjacent areas is available that demonstrates infiltration testing is not necessary, the infiltration testing requirement may be waived.

(5) Waiver of the site specific testing is subject to approval by the City.

(6) Recommendation for foregoing infiltration testing must be submitted in a report which includes supporting data and is stamped and signed by the project engineer or geologist.

(E) Testing Criteria

(1) Except for the Simplified Approach, all testing must be conducted or overseen by a qualified professional who is either a Professional Engineer, Registered Geologist, Soil Scientist or other professional testing service with equivalent training and experience in determining the permeability of soils.

(2) The depth of the test must correspond to the facility depth.

(a) If a confining layer is observed during the subsurface investigation to be within 4 feet of the bottom of the planned infiltration system, the testing should be conducted within that confining layer.

(b) Tests must be performed in the immediate vicinity of the proposed facility.

(c) Exceptions can be made to the test location provided the qualified professional can support that the strata are consistent from the proposed facility to the test location.

(d) Infiltration testing should not be conducted in engineered or undocumented fill.

(F) Minimum Number of Required Tests

(1) The simplified Approach requires one infiltration test for every proposed facility.

(2) The Presumptive Approach requires one infiltration test for every proposed facility or one test for every 100 feet of proposed linear facility.

(3) Generalized soil infiltration rates may be used if facilities are proposed in areas of consistent topography and soil strata as outlined in a Geotechnical report.

(G) Factor of Safety

(1) A minimum factor of safety of 2 shall be applied to field obtained infiltration rates where infiltration of the site performance standard storm per 4.3.110 (B) is proposed.

(H) Presumptive Infiltration Testing Instructions

Open Pit Falling Head Procedure

The open pit falling head procedure is performed in an open excavation and therefore is a test of the combination of vertical and lateral infiltration.

(1) Excavate a hole with bottom dimensions of approximately 2 feet by 2 feet into the native soil to the elevation of the proposed facility bottom. Smooth excavations should be scratched and loose material removed.

(2) Fill the hole with clean water a minimum of 1 foot above the soil to be tested, and maintain this depth of water for at least 4 hours (or overnight if clay soils are present) to presoak the native material.

(a) In sandy soils with little or no clay or silt, soaking is not necessary.

(b) If after filling the hole twice with 12 inches of water, the water seeps completely away in less than 10 minutes, the test can proceed immediately.

(3) Determine how the water level will be accurately measured. The measurements should be made with reference to a fixed point.

(4) After the presaturation period, refill the hole with water to 12 inches above the soil and record the time.

(a) Alternative water head heights may be used for testing provided the presaturation height is adjusted accordingly.

(b) Measure the water level at 10-minute intervals for a total period of 1 hour (or 20-minute intervals for 2 hours in slower soils) or until all of the water has drained.

(c) In faster draining soils (sands and gravels), it may be necessary to shorten the measurement interval in order to obtain a well-defined infiltration rate curve.

(d) Constant head tests may be substituted for falling head tests at the discretion of the professional overseeing the infiltration testing.

(5) Repeat the test.

(a) Successive trials should be run until the percent change in measured infiltration rate between two successive trials is minimal.

(b) The trial should be discounted if the infiltration rate between successive trials increases.

(c) At least three trials must be conducted. After each trial, the water level is readjusted to the 12 inch level.

(6) The average infiltration rate over the last trial should be used to calculate the unfactored infiltration rate. The final rate must be reported in inches per hour.

(7) For very rapidly draining soils, it may not be possible to maintain a water head above the bottom of the test pit. A rate based test may be used if the infiltration rate meets or exceeds the flow of water into the test pit.

Note that a maximum infiltration rate of 20 inches per hour can be used in stormwater system design.

(l) Encased Falling Head Test

The encased falling head procedure is performed with a 6-inch casing that is embedded approximately 6 inches into the native soil. The goal of this field test is to evaluate the vertical infiltration rate through a 6-inch plug of soil, without allowing any lateral infiltration. The test is not appropriate in gravelly soils or in other soils where a good seal with the casing cannot be established.

(1) Embed a solid 6-inch diameter casing into the native soil at the elevation of the proposed facility bottom. Ensure that the embedment provides a good seal around the pipe casing so that percolation will be limited to the 6-inch plug of the material within the casing.

(a) This method can also be used when testing within hollow stem augers, provided the driller and tester are reasonably certain that a good seal has been achieved between the soil and auger.

(3) Fill the pipe with clean water a minimum of 1 foot above the soil to be tested, and maintain this depth for at least 4 hours (or overnight if clay soils are present) to presoak the native material.

(a) Any soil that sloughed into the hole during the soaking period should be removed.

(b) In sandy soils with little or no clay or silt, soaking is not necessary.

(c) If after filling the hole twice with 12 inches of water, the water seeps completely away in less than 10 minutes, the test can proceed immediately.

(4) To conduct the first trial of the test, fill the pipe to approximately 12 inches above the soil and measure the water level.

(a) Alternative water head heights may be used for testing provided the presaturation height is adjusted accordingly.

(b) The level should be measured with reference to a fixed point. Record the exact time.

(c) Measure the water level at 10-minute intervals for a total period of 1 hour (or 20-minute intervals for 2 hours in slower soils) or until all of the water has drained.

(d) In faster draining soils (sands and gravels), it may be necessary to shorten the measurement interval in order to obtain a well-defined infiltration rate curve.

(i) Constant head tests may be substituted for falling head tests at the discretion of the professional overseeing the infiltration testing.

(ii) Successive trials should be run until the percent change in measured infiltration rate between two successive trials is minimal.

(iii) The trial should be discounted if the infiltration rate between successive trials increases.

(iv) At least three trials must be conducted.

(v) After each trial, the water level is readjusted to the 12 inch level.

(vi) The average infiltration rate over the last trial should be used to calculate the unfactored infiltration rate.

(vii) Alternatively, the infiltration rate measured over the range of water head applicable to the project stormwater system design may be used at the discretion of the professional overseeing the testing.

(viii) The final rate must be reported in inches per hour.

(J) Double Ring Infiltrometer Test

(1) The double-ring infiltrometer test procedure should be performed in accordance with ASTM 3385-94.

(2) The test is performed within two concentric casings embedded and sealed to the native soils. The outer ring maintains a volume of water to diminish the potential of lateral infiltration through the center casing. The volume of water added to the center ring to maintain a static water level is used to calculate the infiltration rate.

(3) The double-ring infiltrometer is appropriate only in soils where an adequate seal can be established.

(K) Reporting Requirements

The following information should be included in the Infiltration Testing Report. The Infiltration Testing Report should be attached to the project's Stormwater Management Report:

(1) Statement of project understanding (proposed stormwater system).

(2) Summary of subsurface conditions encountered.

(3) Summary of infiltration testing including location and number of tests and testing method used.

(4) Discussion of how the tests were performed (i.e. pipe type or diameter or test pit dimensions).

(5) Infiltration testing results in inches per hour.

(6) Recommended design infiltration rate including factors of safety.

(7) Groundwater observations within exploration and an estimate of the depth to seasonal high groundwater.

(8) Site plan showing location of infiltration tests.

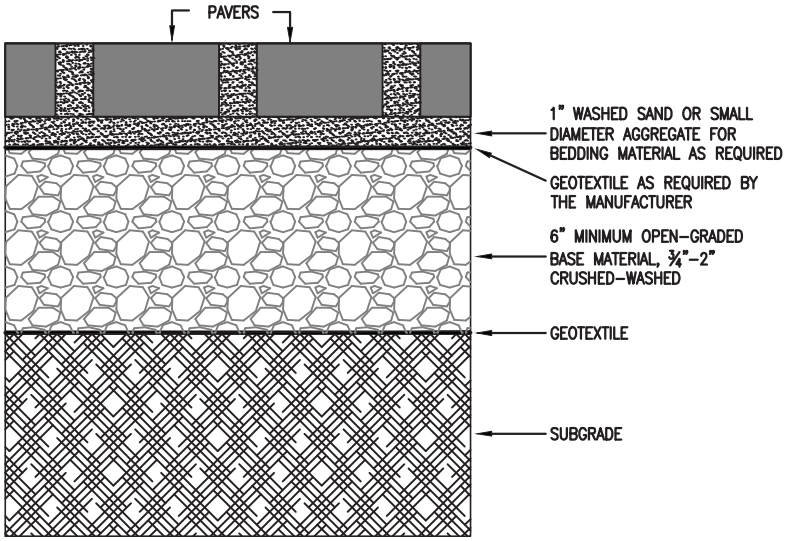
(9) Boring or test pit logs.

(a) The logs should include an associated soil classification consistent with ASTM D2488-00, Standard Practice for Classification for Description and Identification of Soils (Visual-Manual Procedure).

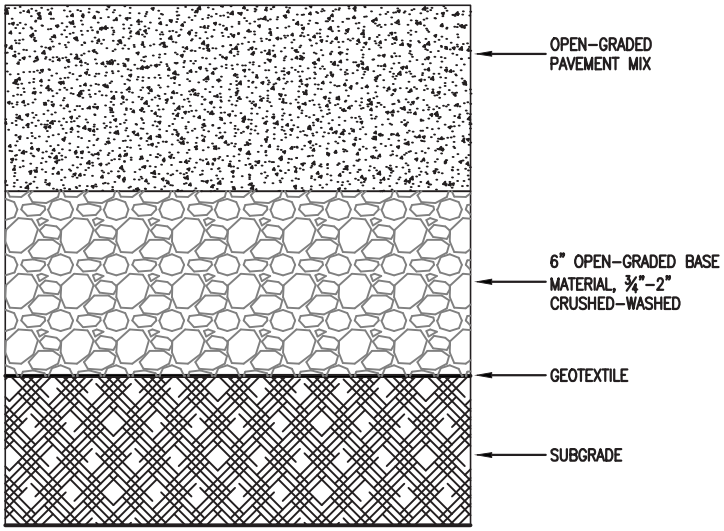
(b) The logs should also include any additional pertinent subsurface information, such as soil moisture conditions, depth and description of undocumented or engineered fill, soil color and mottling conditions, soil stiffness or density, and approximate depth of contact between soil types.

(10) Infiltration Test Data

APPENDIX D
TYPICAL FACILITY DETAILS

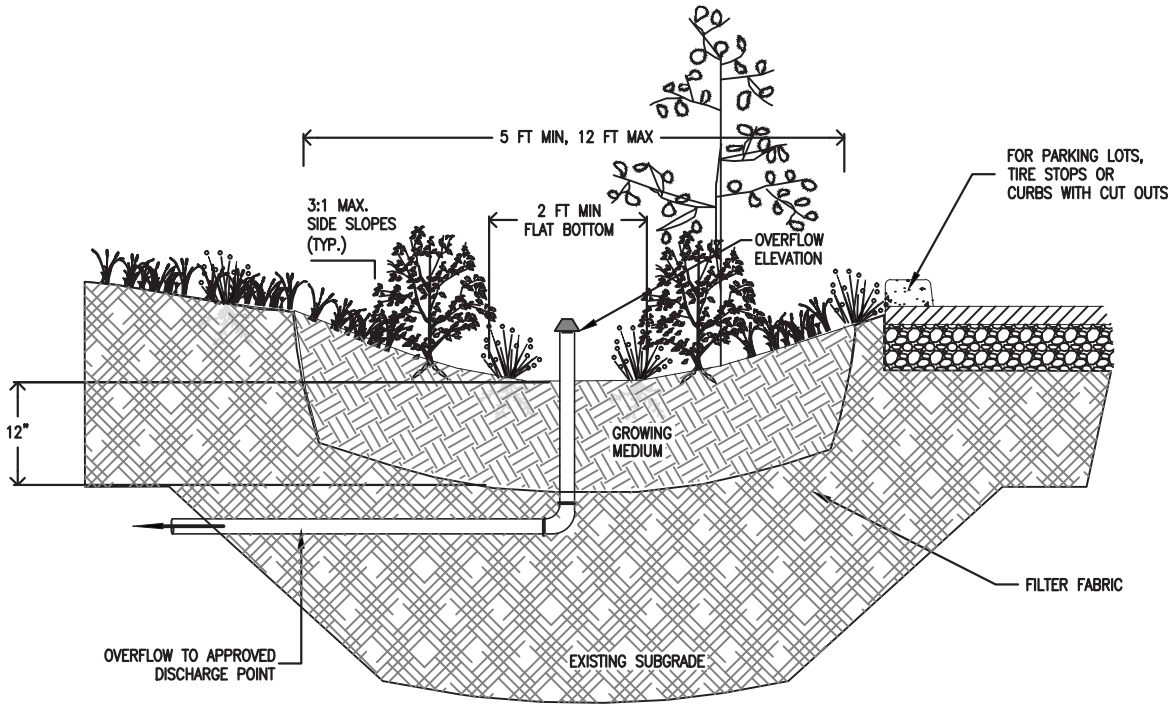


PERMEABLE CONCRETE BLOCK
OR "PAVER" SYSTEMS



PERVIOUS (OPEN GRADED) CONCRETE
AND ASPHALT

	PERMEABLE PAVEMENT TYPICAL DETAILS	



1. Provide protection from all vehicle traffic, equipment staging, and foot traffic in proposed infiltration areas prior to, during, and after construction.

2. Dimensions:
   a. Width of swale: 5' - 12'.
      Depth of swale: 12"
   b. Longitudinal slope of swale: 0.5% min and 6% max.
   c. Flat bottom width: 2' minimum.
   d. Side slopes of swale: 3:1 maximum.

3. Setbacks (from centerline of facility):
   a. Infiltration swales must be 10' from foundations and 5' from property lines.
   b. Filtration swales must have a waterproof liner when within 10' from foundation of 5' from property lines.

4. Overflow:
   a. Overflows are required to an approved point discharge point unless sized to fully infiltrate the flood control design storm.
   b. Inlet elevation must allow for 2" of freeboard, minimum.

5. Piping: Minimum 3" pipe required for up to 1,500 sq ft of impervious area, otherwise 4" min. Piping material, slopes and installation shall follow the Uniform Plumbing Code.

6. Drain rock:
   a. Size: 3/4" - 2-1/2" washed
   b. Depth: 12" minimum

7. A geotextile is required to isolate the drain rock from the subgrade and growing medium.

8. Growing medium:
   a. In 0-2 year TOTZ, a 24" minimum with at least 50% organic material
   b. In all other areas, 12" minimum
   c. Import topsoil or amended native soil

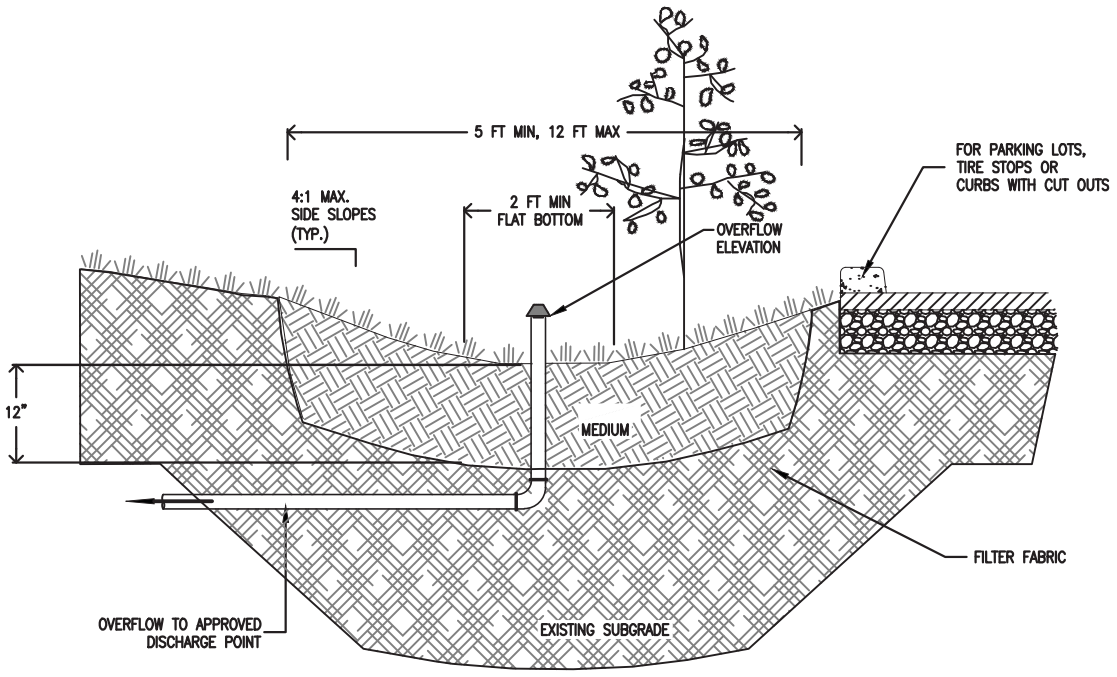
9. Vegetation: Follow landscape plans otherwise refer to plant list in SWMM Appendix F. Vegetative swales must have following plantings per 100sf of facility area:
   a. 100 Ground Covers, OR
   b. 80 Ground Covers, 2 Small Shrubs, 4 Large Shrubs, and 1 Tree (deciduous or evergreen)

10. Waterproof liner: Shall be 30 mil PVC or equivalent for flow-through facilities.

11. Install washed pea gravel or river rock to transition from inlets and splash pad to growing medium.

12. Check dams: Shall be placed at 12" intervals along the length of the swale.

	VEGETATED SWALE TYPICAL DETAILS	



1. Provide protection from all vehicle traffic, equipment staging, and foot traffic in proposed infiltration areas prior to, during, and after construction.

2. Dimensions:
   a. Width of swale: 5' - 12'.
      Depth of swale: 12"
   b. Longitudinal slope of swale: 0.5% min and 6% max.
   c. Bottom width: 2' minimum.
   d. Side slopes: 3:1 maximum for vegetative and 4:1 for grassy.

3. Setbacks (from centerline of facility):
   a. Infiltration swales must be 10' from foundations and 5' from property lines.
   b. Filtration swales must have a waterproof liner when within 10' from foundation of 5' from property lines.

4. Overflow:
   a. Overflows are required to an approved point discharge point unless sized to fully infiltrate the flood control design storm.
   b. Inlet elevation must allow for 2" of freeboard, minimum.

5. Piping: Minimum 3" pipe required for up to 1,500 sq ft of impervious area, otherwise 4" min. Piping material, slopes and installation shall follow the Uniform Plumbing Code.

6. Growing medium:
   a. In 0-2 year TOTZ, a 24" minimum with at least 50% organic material
   b. In all other areas, 12" minimum
   c. Import topsoil or amended native soil

7. Vegetation: Follow landscape plans otherwise refer to plant list in SWMM Appendix F. Grassy swales must have 100 coverage. Vegetative swales must have following plantings per 100sf of facility area:
   a. 100 Ground Covers, OR
   b. 80 Ground Covers, 2 Small Shrubs, 4 Large Shrubs, and 1 Tree (deciduous or evergreen)

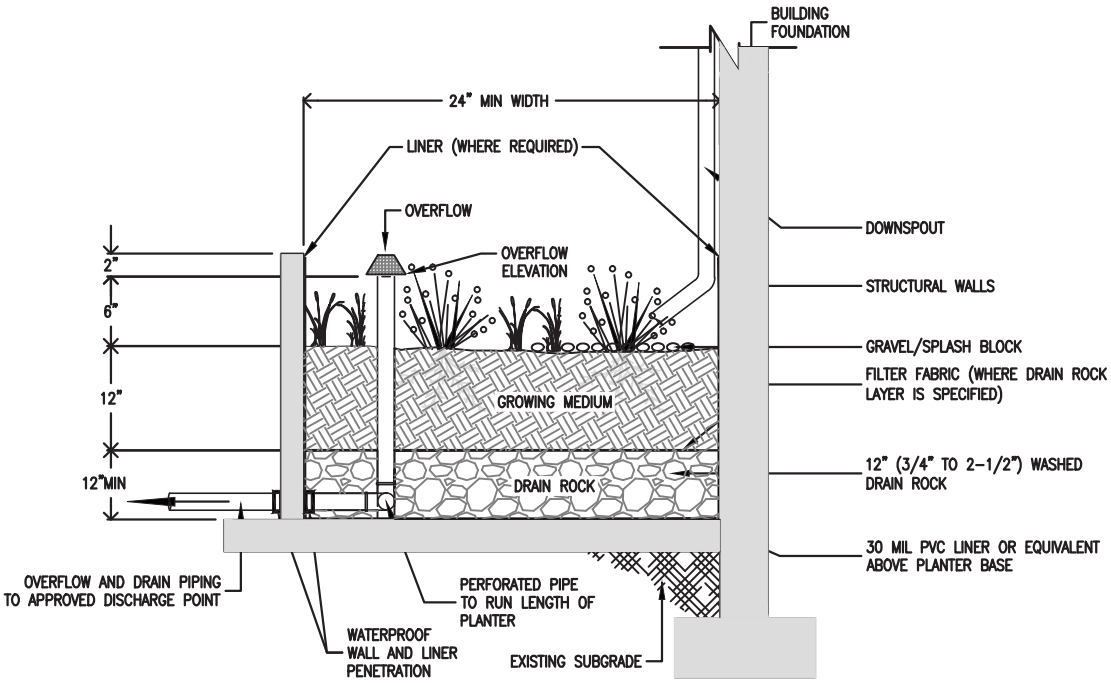
8. Waterproof liner: Shall be 30 mil PVC or equivalent where required.

9. Install washed pea gravel or river rock to transition from inlets and splash pad to growing medium.

10. Check dams: Shall be placed at 12" intervals along the length of the swale.

GRASSY SWALE

TYPICAL DETAILS



1. Provide protection from all vehicle traffic, equipment staging, and foot traffic in proposed infiltration areas prior to, during, and after construction.

2. Dimensions:
   a. Width of planter: 24” minimum.
   b. Depth of planter: 6" minimum from top of growing medium to overflow elevation.
   c. Slope of planter: 0.5% or less.

3. Setbacks:
   a. Infiltration planters must be 10' from foundations and 5' from property lines.
   b. Filtration planters do not require a setback with an approved waterproof liner.

4. Overflow:
   a. Overflows are required to an approved discharge point when using the Simplified Method
   b. Overflows are not required when sized to fully infiltrate the flood control event using the Presumptive Method.
   c. Minimum 2" freeboard from overflow elevation to the top of the planter walls.

5. Piping: Minimum 3” pipe required for up to 1,500 sq ft of impervious area, otherwise 4” min. Piping material, slopes and installation shall follow the Uniform Plumbing Code.

6. Drain rock:
   a. Size: 3/4” to 2-1/2" diameter open graded
   b. Depth: 12” Minimum
   c. Length and Width: Full length and width of facility

7. Drain rock layer shall be separated from the growing medium by a geotextile

8. Growing medium:
   a. In 0-2 year TOTZ, a 24" minimum with at least 50% organic material
   b. In all other areas, 12" minimum
   c. Import topsoil or amended native soil

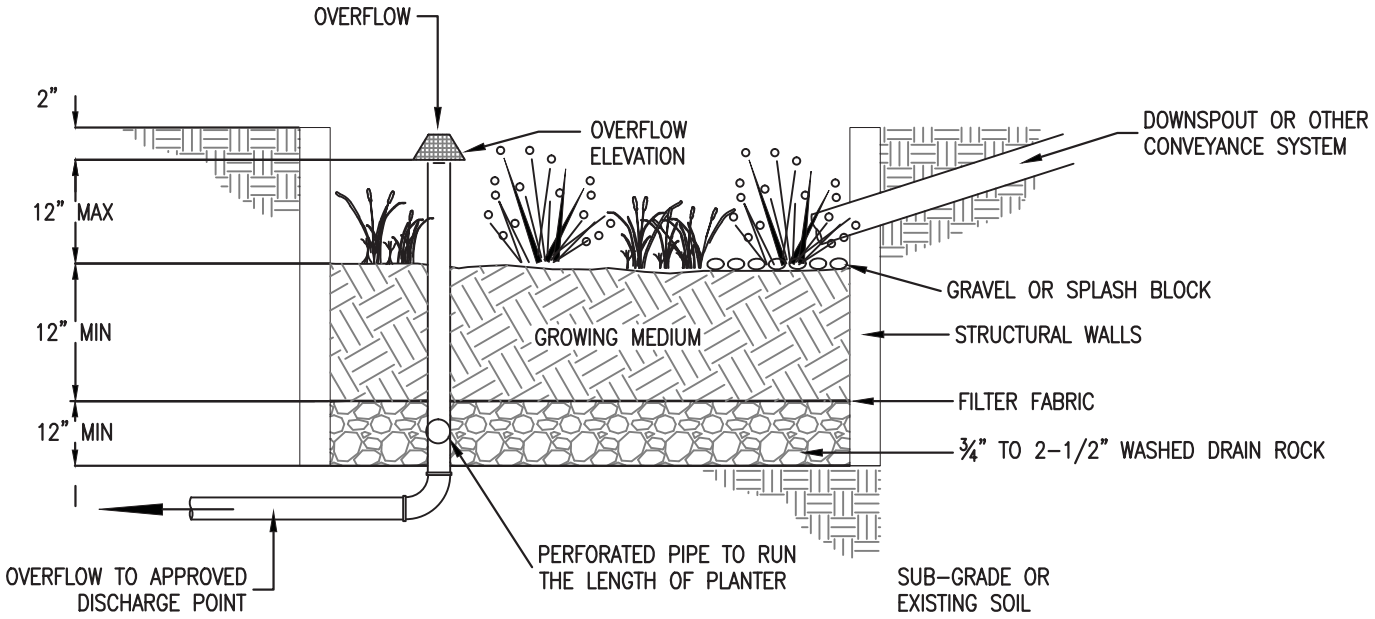
9. Vegetation: Follow landscape plans otherwise refer to plant list in SWMM Appendix F. Number of plantings per 100sf of facility area:
   a. 100 Ground Covers, OR
   b. 80 Ground Covers and 4 Small Shrubs, OR
   c. 60 Ground Covers and 12 Small Shrubs

10. Planter walls:
   a. Material shall be stone, brick, concrete, wood, or other durable material (no chemically treated wood).
   b. Walls shall be included on building plans here incorporated into foundations or other permitted structures..

11. Waterproof liner (where required): Shall be 30 mil PVC or equivalent.

12. Install washed pea gravel or river rock to transition from inlet or splash pad to growing medium.

	FOUNDATION FILTRATION PLANTER TYPICAL DETAILS	



1. Provide protection from all vehicle traffic, equipment staging, and foot traffic in proposed infiltration areas prior to, during, and after construction.

2. Dimensions:
   a. Width of planter: 24” minimum.
   b. Depth of planter: 6" minimum from top of growing medium to overflow elevation.
   c. Slope of planter: 0.5% or less.

3. Setbacks:
   a. Infiltration planters must be 10' from foundations and 5' from property lines.
   b. Filtration planters do not require a setback with an approved waterproof liner.

4. Overflow:
   a. Overflows are required to an approved discharge point when using the Simplified Method
   b. Overflows are not required when sized to fully infiltrate the flood control event using the Presumptive Method.
   c. Minimum 2" freeboard from overflow elevation to the top of the planter walls.

5. Piping: Minimum 3” pipe required for up to 1,500 sq ft of impervious area, otherwise 4” min. Piping material, slopes and installation shall follow the Uniform Plumbing Code.

6. Drain rock:
   a. Size: 3/4” to 2-1/2" diameter open graded
   b. Depth: 12” Minimum
   c. Length and Width: Full length and width of facility

7. Drain rock layer shall be separated from the growing medium by a geotextile filter fabric

8. Growing medium:
   a. In 0-2 year TOTZ, a 24" minimum with at least 50% organic material
   b. In all other areas, 12" minimum
   c. Import topsoil or amended native soil.

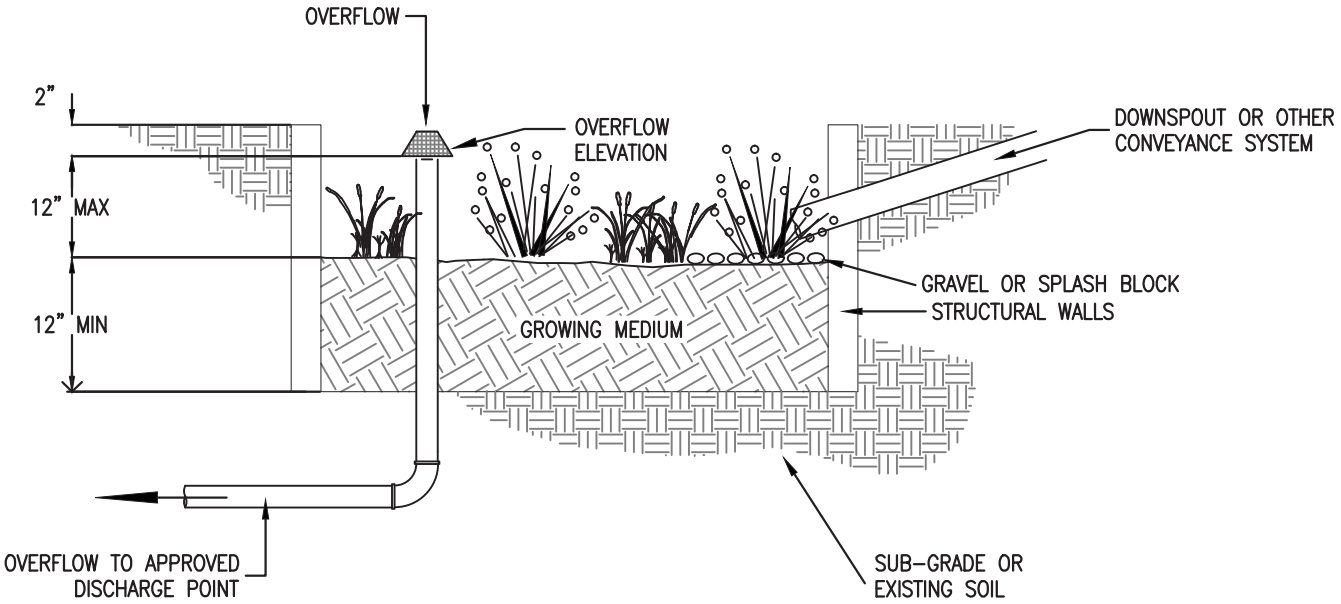
9. Vegetation: Follow landscape plans otherwise refer to plant list in SWMM Appendix F. Minimum container size is 1 gallon. # of plantings per 100sf of facility area:
   a. 100 Ground Covers, OR
   b. 80 Ground Covers and 4 Small Shrubs, OR
   c. 60 Ground Covers and 12 Small Shrubs

10. Planter walls:
   a. Material shall be stone, brick, concrete, wood, or other durable material (no chemically treated wood).
   b. Walls shall be included on building plans here incorporated into foundations or other permitted structures..

11. Waterproof liner (where required): Shall be 30 mil PVC or equivalent.

12. Install washed pea gravel or river rock to transition from inlet or splash pad to growing medium.

	FILTRATION PLANTER TYPICAL DETAILS	



1. Provide protection from all vehicle traffic, equipment staging, and foot traffic in proposed infiltration areas prior to, during, and after construction.

2. Dimensions:
   a. Width of planter: 24" minimum.
   b. Depth of planter: 6" minimum from top of growing medium to overflow elevation.
   c. Slope of planter: 0.5% or less.

3. Setbacks:
   a. Infiltration planters must be 10' from foundations and 5' from property lines.
   b. Filtration planters do not require a setback with an approved waterproof liner.

4. Overflow:
   a. Overflows are required to an approved discharge point when using the Simplified Method
   b. Overflows are not required when sized to fully infiltrate the flood control event using the Presumptive Method.
   c. Minimum 2" freeboard from overflow elevation to the top of the planter walls.

5. Piping: Minimum 3" pipe required for up to 1,500 sq ft of impervious area, otherwise 4" min. Piping material, slopes and installation shall follow the Uniform Plumbing Code.

6. Growing medium:
   a. In 0-2 year TOTZ, a 24" minimum with at least 50% organic material
   b. In all other areas, 12" minimum
   c. Import topsoil or amended native soil

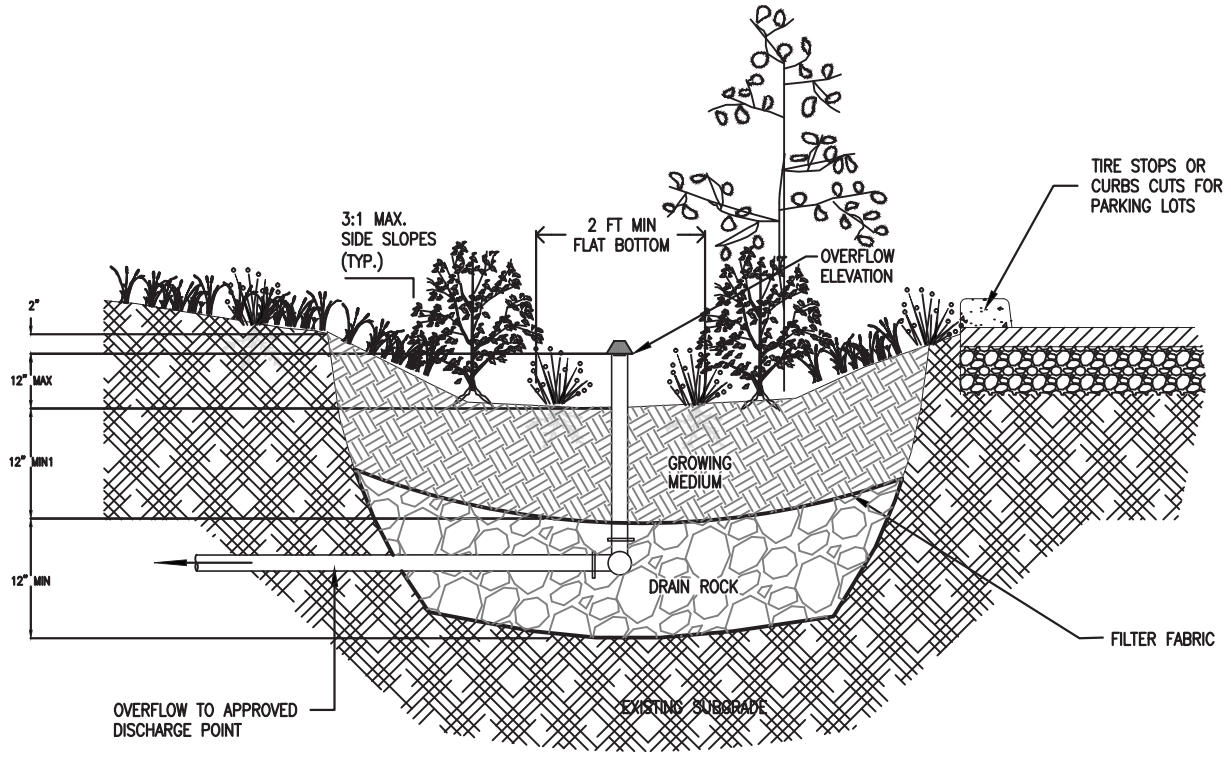
7. Vegetation: Follow landscape plans otherwise refer to plant list in SWMM Appendix F. Minimum container size is 1 gallon. # of plantings per 100sf of facility area:
   a. 100 Ground Covers, OR
   b. 80 Ground Covers and 4 Small Shrubs, OR
   c. 60 Ground Covers and 12 Small Shrubs

8. Planter walls:
   a. Material shall be stone, brick, concrete, wood, or other durable material (no chemically treated wood).
   b. Walls shall be included on building plans here incorporated into foundations or other permitted structures..

9. Install washed pea gravel or river rock to transition from inlet or splash pad to growing medium.

INFILTRATION PLANTER

TYPICAL DETAILS



1. Provide protection from all vehicle traffic, equipment staging, and foot traffic in proposed infiltration areas prior to, during, and after construction.

2. Dimensions:
   a. Depth of rain garden: 6" minimum and 12" maximum
   b. Flat bottom width: 2' min.
   c. Side slopes of Rain Garden: 3:1 maximum.

3. Setbacks:
   a. Infiltration rain gardens must be 10' from foundations and 5' from property lines. Filtration Rain Garden do not require a setback with an approved waterproof liner.

4. Overflow:
   a. Overflows are required unless sized to fully infiltrate the flood control design storm.
   b. Inlet elevation must allow for 2" of freeboard, minimum.

5. Piping: Minimum 3" pipe required for up to 1,500 sq ft of impervious area, otherwise 4" min. Piping material, slopes and installation shall follow the Uniform Plumbing Code.

6. Drain rock:
   a. Size: 3/4"-2-1/2" washed
   b. Depth: 12" Minimum

7. Drain rock later shall be separated form the growing medium and the surround soils by a geotextile filter fabric.

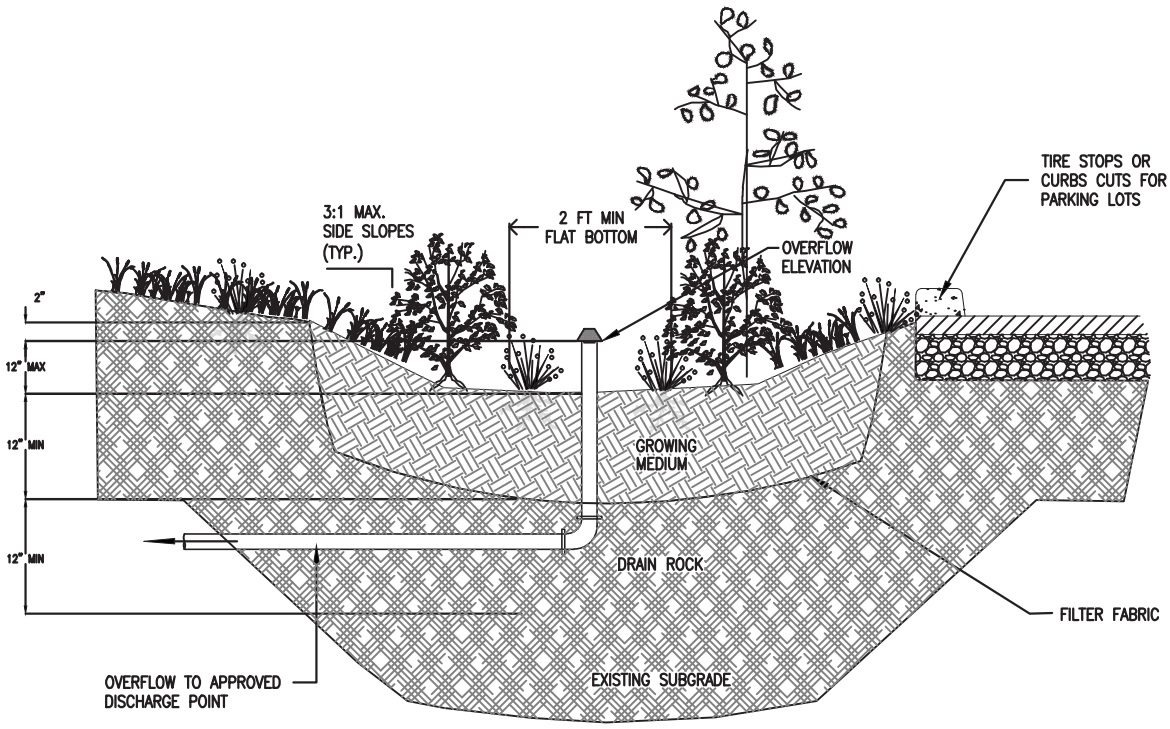
8. Growing medium:
   a. In 0-2 year TOTZ, a 24" minimum with at least 50% organic material
   b. In all other areas, 12" minimum
   c. Import topsoil or amended native soil

9. Vegetation: Follow landscape plans otherwise refer to plant list in SWMM Appendix F. Number of plantings per 100sf of facility area:
   a. 100 Ground Covers, OR
   b. 80 Ground Covers, 2 Large Shrubs 4 Small Shrubs and 1 tress (deciduous or evergreen)

10. Install washed pea gravel or river rock to transition from inlets and splash pad to growing medium.

FILTRATION RAIN GARDEN

TYPICAL DETAILS



1. Provide protection from all vehicle traffic, equipment staging, and foot traffic in proposed infiltration areas prior to, during, and after construction.

2. Dimensions:
   a. Depth of rain garden: 6" minimum and 12" maximum
   b. Flat bottom width: 2' min.
   c. Side slopes of Rain Garden: 3:1 maximum.

3. Setbacks:
   a. Infiltration rain gardens must be 10' from foundations and 5' from property lines. Filtration Rain Garden do not require a setback with an approved waterproof liner.

4. Overflow:
   a. Overflows are required unless sized to fully infiltrate the flood control design storm.
   b. Inlet elevation must allow for 2" of freeboard, minimum.

5. Piping: Minimum 3" pipe required for up to 1,500 sq ft of impervious area, otherwise 4" min. Piping material, slopes and installation shall follow the Uniform Plumbing Code.

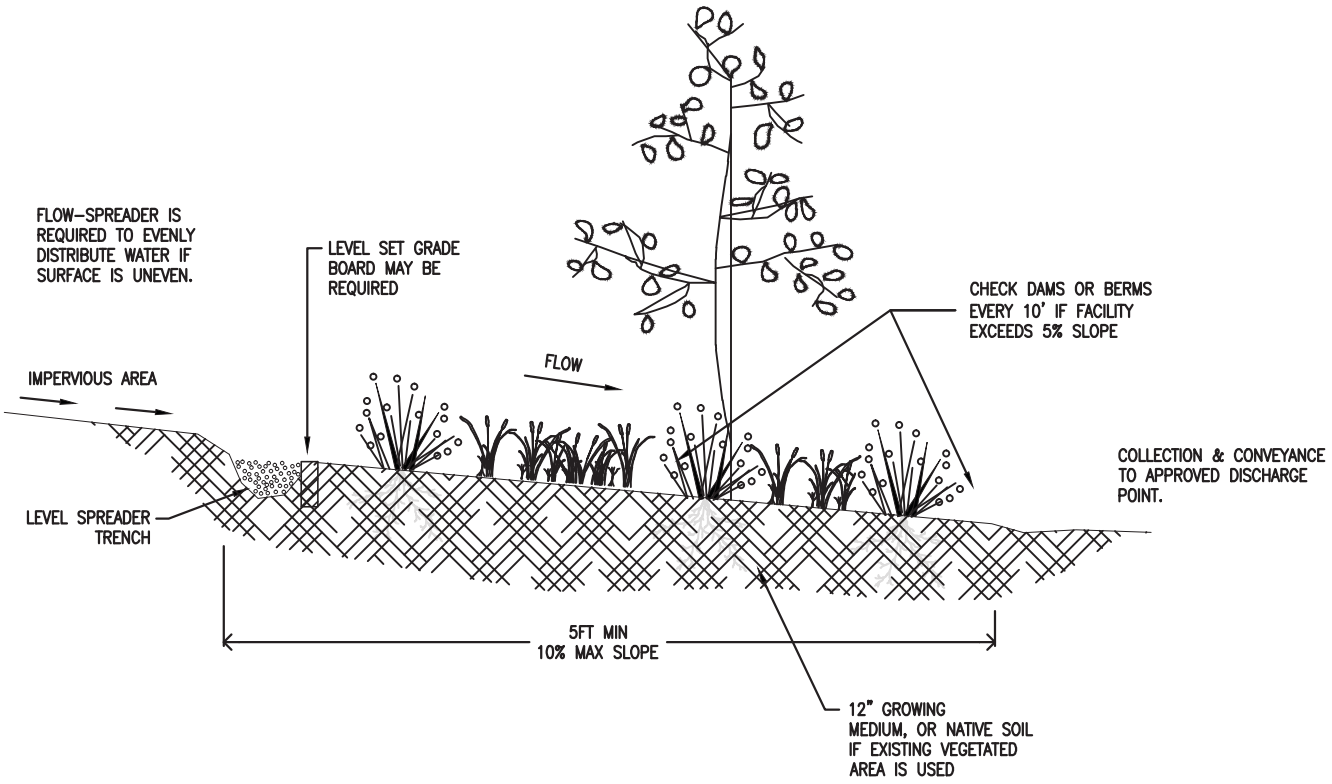
6. Growing medium:
   a. In 0-2 year TOTZ, a 24" minimum with at least 50% organic material
   b. In all other areas, 12" minimum
   c. Import topsoil or amended native soil

7. Vegetation: Follow landscape plans otherwise refer to plant list in SWMM Appendix F. Number of plantings per 100sf of facility area:
   a. 100 Ground Covers, OR
   b. 80 Ground Covers, 2 Large Shrubs 4 Small Shrubs and 1 tress (deciduous or evergreen)

8. Install washed pea gravel or river rock to transition from inlets and splash pad to growing medium.

INFILTRATION RAIN GARDEN

TYPICAL DETAILS



1. Provide protection from all vehicle traffic, equipment staging, as well as foot traffic for proposed infiltration areas prior to and during construction.

2. Dimensions:
    a. Flow line length: 5' minimum.
    b. Slopes: 0.5 - 10%

3. Setbacks (from beginning of facility):
    a. 5' from property line
    b. 10ft from buildings
    c. 50ft from wetlands, rivers, streams, and creeks where required.

4. Overflow: Collection from filter strip shall be specified on plans to approved discharge point.

5. Growing medium: Unless existing vegetated areas are used for the filter strip, growing medium shall be used within the top 12".

6. Vegetation: The entire filter strip must have 100% coverage by native grasses, native wildflower blends, native ground covers, or any combination thereof. Follow landscape plans otherwise refer to plant list in SWMM Appendix F. Number of plantings per 100sf of facility area:
    a. 100 Ground Covers, OR
    b. 80 Ground Covers, 4 Small Shrubs, OR
    c. 60 Ground Covers, 12 Small Shrubs

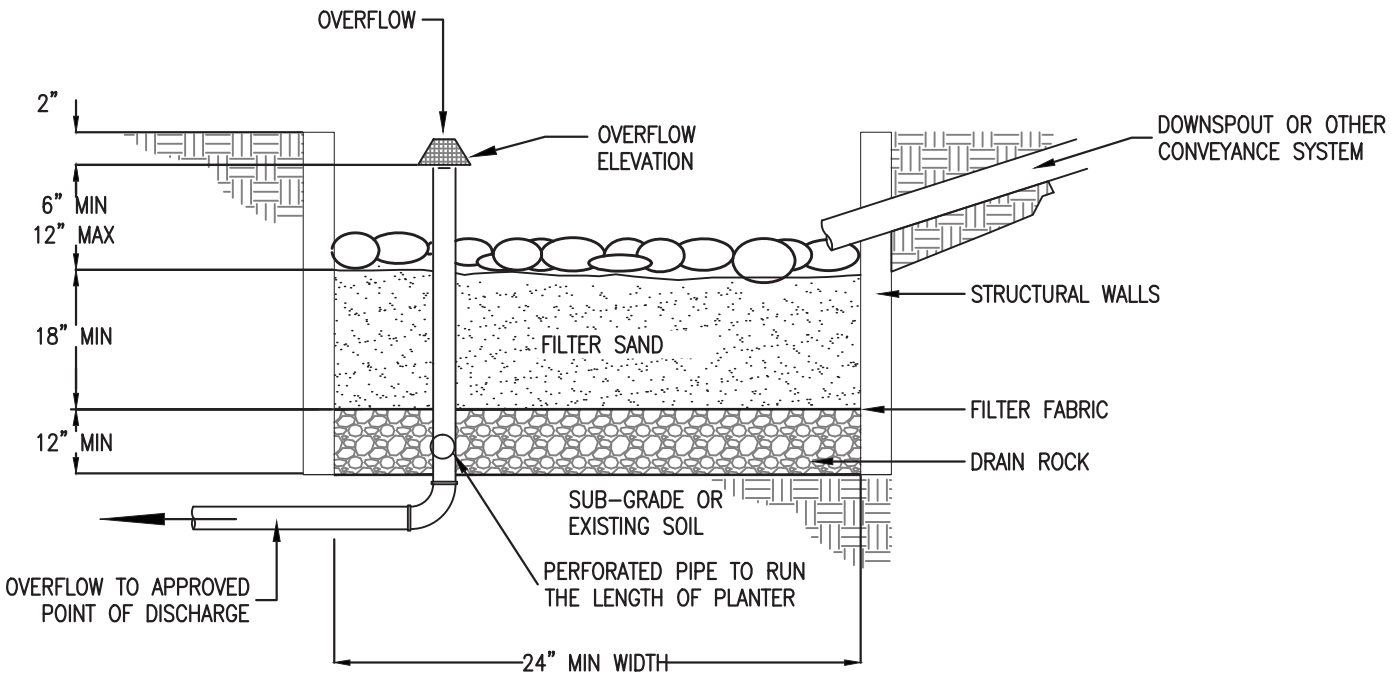
7. Level Spreaders: A grade board, perforated pipe, berm or trench may be required to disperse the runoff evenly across the filter strip to prevent a point of discharge. The top of the level spreader must be horizontal and at an appropriate height to provide sheet flow directly to the soil without scour. Grade boards can be made of any material that will withstand weather and solar degradation. Trenches used as level spreaders can be open or filled with washed crushed rock, pea gravel, or sand

8. Check dams: shall be placed according to facility design otherwise:

    a. Equal to the width of the filter
    b. Every 10' where slope exceeds 5%.

FILTER STRIP

TYPICAL DETAILS



1. Provide protection from all vehicle traffic, equipment staging, and foot traffic in proposed infiltration areas prior to, during, and after construction.

2. Dimensions:
   a. Width: 24" minimum.
   b. Depth: 6" minimum
   c. Slope: 0.5% or less

3. Setbacks (from centerline of f):
   a. Infiltration sand filters must be 10' from foundations and 5' from property lines. Filtration sand filters do not have setbacks with an approved waterproof liner.

4. Overflow:
   a. Overflows are required to an approved point of discharge.
   b. Inlet elevation must allow for 2" of freeboard, minimum.

5. Piping: Minimum 3" pipe required for up to 1,500 sq ft of impervious area, otherwise 4" min. Piping material, slopes and installation shall follow the Uniform Plumbing Code.

6. Drain rock (minimum): 12" minimum of 3/4" - 2-1/2" washed.
   .

7. Separation between drain rock: Drain rock shall be separated from sand layer and surrounding sold by a geotextile filter fabric

8. Filter sand:
   a. 18" minimum.
   b. See sand specification in SWMM.

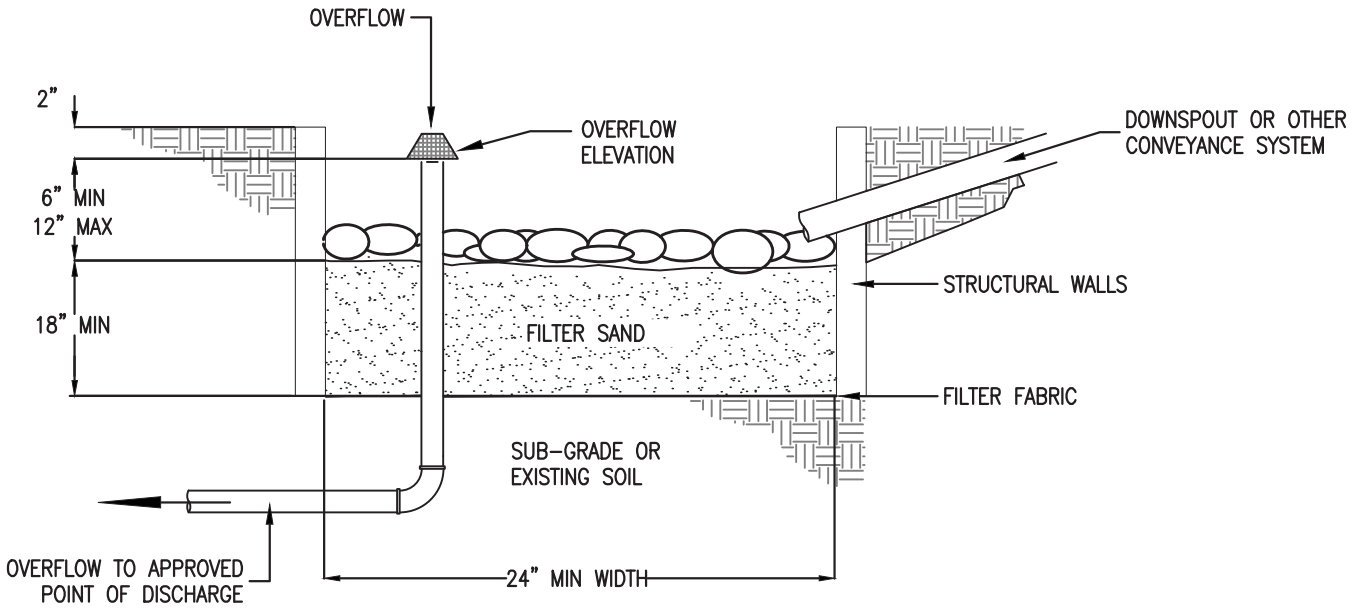
9. Sand filter walls:
   a. Material shall be stone, brick, concrete, wood, or other durable material (no chemically treated wood).
   b. Filter walls built into foundation walls shall be shown on building plans.

10. Waterproof liner (where required): Shall be 30 mil PVC or equivalent.

11. Install washed pea gravel or river rock to transition from inlet or splash pad to growing medium.

FILTRATION SAND FILTER

TYPICAL DETAILS



1. Provide protection from all vehicle traffic, equipment staging, and foot traffic in proposed infiltration areas prior to, during, and after construction.

2. Dimensions:
   a. Width: 24" minimum
   b. Depth: 6" minimum
   c. Slope: 0.5% or less.

3. Setbacks:
   a. Infiltration sand filters must be 10' from foundations and 5' from property lines.
   b. Flow-through sand filters must be less than 30" in height above surrounding area if within 5 feet of property line.

4. Overflow (where required):
   a. Overflow required for Simplified Approach.
   b. Inlet elevation must allow for 2" of freeboard, minimum.
   c. Protect from debris, sand, and sediment with strainer or grate.

5. Piping: Minimum 3" pipe required for up to 1,500 sq ft of impervious area, otherwise 4" min. Piping material, slopes and installation shall follow the Uniform Plumbing Code.

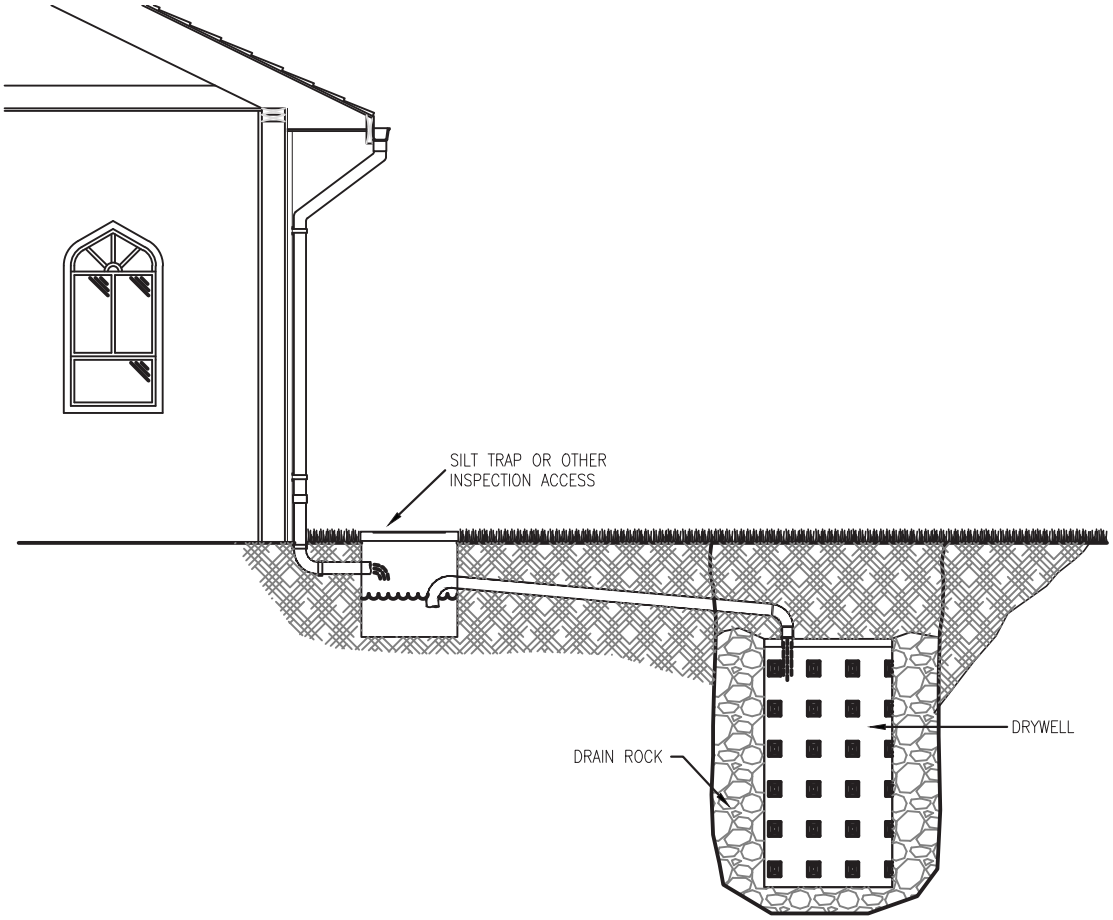
6. Filter sand:
   a. 18" minimum.
   b. See sand spec in SWMM Exhibit 2-4.

7. Sand filter walls:
   a. Material shall be stone, brick, concrete, wood, or other durable material (no chemically treated wood).
   b. Concrete, brick, or stone walls shall be included on foundation plans.

8. Install washed pea gravel or river rock to transition from inlet or splash pad to growing medium.

INFILTRATION SAND FILTER

TYPICAL DETAILS



1. All drywells are considered Class 5 injection wells and must be registered with the Oregon Department of Environmental Quality as Underground Injection Control (UIC) systems.

2. Provide protection from all vehicle traffic, equipment staging, and foot traffic in proposed infiltration areas prior to, during, and after construction.

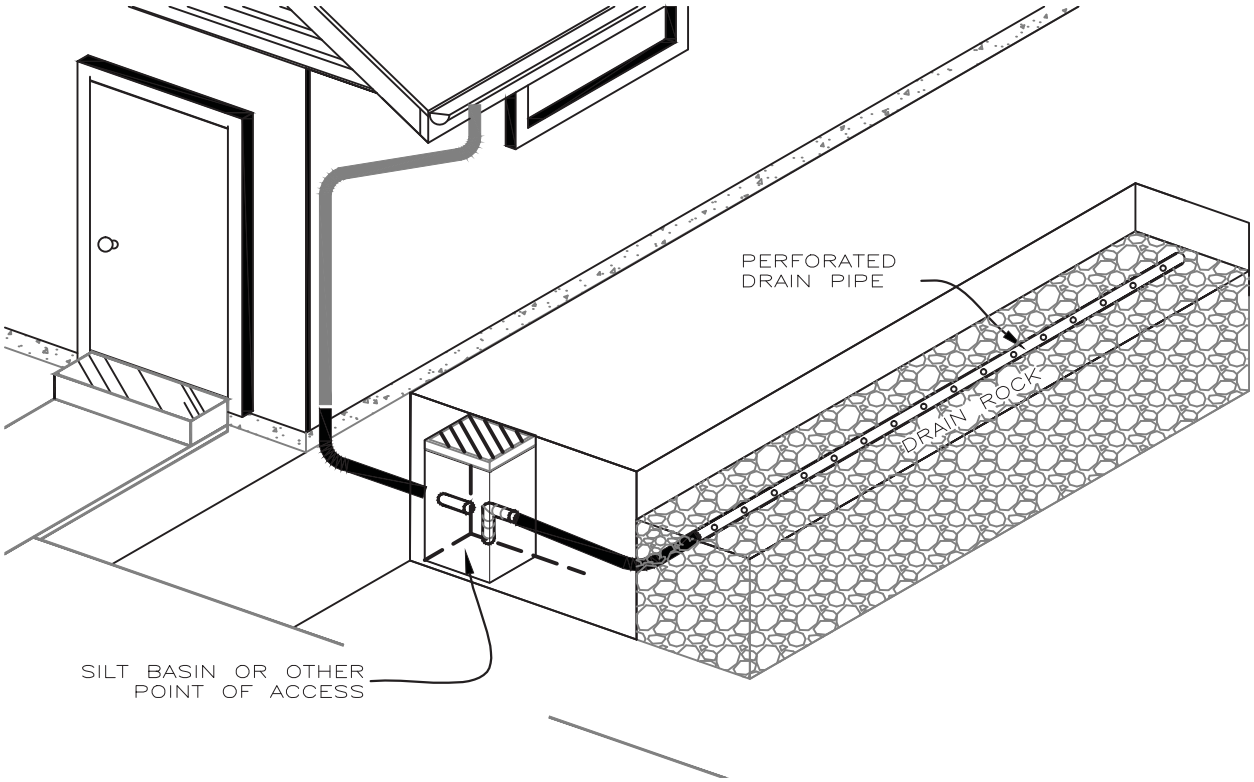
3. Drywells shall be designed using the presumptive approach due to the limited soil conditions in Eugene and the need to fully infiltrate the flood control design storm. This detail is intended to illustrate a typical drywell installation. Installation shall conform to the drywell design provided by the Presumptive Method.

4. Setbacks (from center of facility):
   a. 10' from foundations
   b. 5' from property lines

5. Piping: Minimum 3" pipe required for up to 1,500 sq ft of impervious area, otherwise 4" min. Piping material, slopes and installation shall follow the Uniform Plumbing Code.

6. Silt Traps: A silt trap or other access point is required at finished grade for inspection and maintenance access

	DRYWELL TYPICAL DETAILS	



1. All soakage trenches are considered injection wells and must be registered with the Oregon Department of Environmental Quality as Underground Injection Control (UIC) systems.

2. Provide protection from all vehicle traffic, equipment staging, and foot traffic in proposed infiltration areas prior to, during, and after construction.

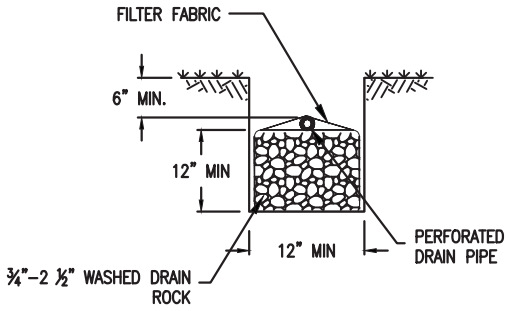
3. Soakage trenches shall be designed using the presumptive approach due to the limited soil conditions in Eugene and the need to fully infiltrate the flood control design storm. This detail is intended to illustrate a typical soakage trench installation. Installation shall conform to the soakage trench design provided by the Presumptive Method.

4. Setbacks (from center of facility):
   a. 10' from foundations
   b. 5' from property lines

5. Piping: Minimum 3" pipe required for up to 1,500 sq ft of impervious area, otherwise 4" min. Piping material, slopes and installation shall follow the Uniform Plumbing Code.

6. Silt Traps: A silt trap or other access point is required at finished grade for inspection and maintenance access

SOAKAGE TRENCH
TYPICAL CROSS SECTION



SOAKAGE TRENCH

TYPICAL DETAILS

APPENDIX E
OPERATIONS AND MAINTENANCE

This appendix presents the operation and maintenance (O&M) requirements for stormwater management facilities designed and installed in the City of Springfield pursuant to SDC 4.3.110.

INTRODUCTION

Notice of Operations and Maintenance Agreement – (NOMA)

The NOMA must be in a form approved by the City Attorney and must identify the property as having a stormwater management facility and the responsible party for future operations and maintenance. *The NOMA must be completed and recorded at Lane County Deeds and Records. Signatures on the NOMA shall be notarized.*

The intent of the NOMA is to ensure that the facility will be identified to future property owners and that the facility will be maintained according to the Springfield Development Code, Springfield Municipal Code, the O&M Agreement, and the O&M Plan for the site.

Operations and Maintenance Agreement – (O&M Agreement)

The O&M Agreement must be on a form approved by the City Attorney and must identify the property as having a stormwater management facility; the owner's name, address, email, and phone number; the site address; financially responsible party for ongoing operation and maintenance; and parties responsible for inspecting and maintaining the facility.

The O&M Agreement does not need to be recorded. The intent of the Agreement is to ensure that the facility will be maintained for functionality, aesthetics, and will identify accountability. The stormwater site plan attached to the Agreement will help identify to the owners and inspectors the location and the functions of the stormwater facilities, and the Facility Specific O&M Plan will identify the routine maintenance procedures and scheduling.

Facility Specific Operations and Maintenance Plan – (&M Plan)

This appendix provides pre-approved Facility Specific Operations and Maintenance Plans (O&M Plans) for various types of stormwater quality facilities. Stormwater facilities that are not included in this appendix (i.e. a manufactured stormwater treatment technology), are required to submit an O&M Plan that meets the manufacturer's requirements and facility specific operations and maintenance activities consistent with ongoing function of the stormwater facility(ies).

The O&M Plan strategies in this appendix apply to all stormwater management facilities and related facility components identified in SDC 4.3.110. Stormwater destination facilities are required to be operated and maintained in working condition for the life of the facility.

Private Facilities:

Record a copy of the NOMA with Lane County Deeds and Records. Submit with the final site plan, a *recorded copy* of the NOMA, the O&M Agreement, and the Facility Specific Operations and Maintenance Plan (O&M Plan) for each type of stormwater management facility permitted on the site. The operations and maintenance activities listed on the O&M Plan documents, which will be on file with the City Engineer, may later be revised with City Engineer approval.

Public Facilities:

Submit a copy of a Facility Specific O&M Plan with the Public Improvement Permit Project. County recording of this plan is not necessary.

OPERATIONS AND MAINTENANCE PLAN SUBMITTALS

Privately Maintained Facilities

The *O&M Plan* for a privately maintained facility shall include the following components for each development site. A complete Plan must be submitted and approved as provided in SDC 4.3.110.

1. A recorded copy of the Notice of Operation and Maintenance Agreement (NOMA)
2. Operations and Maintenance Agreement (O&M Agreement)
3. Stormwater Management Site Plan (as approved under the Development Agreement)
4. Landscape Plan
5. Stormwater Management Facility Inspection and Maintenance Log
6. Facility-Specific Operations and Maintenance Plan(s) (O&M Plan(s))

Detailed submission requirements for the above items are found below.

1.) ***Notice of Operations and Maintenance Agreement – (NOMA)*****:** The NOMA identifies the property as having a stormwater management facility and identifies the responsible party for future operations and maintenance. *The Notice must be completed and recorded at Lane County Deeds and Records. Signatures on the Notice shall be notarized.* The NOMA may be submitted in person or mailed, along with payment of the applicable fees, to the County Recorder's Office. Lane County Deeds and Records, 125 E 8th Avenue, Eugene, OR 97401.

https://www.lanecounty.org/government/county_departments/county_administration/operations/county_clerk/real_property_recording/document_recording_requirements

The property description on the NOMA must be a full legal description of the property and may not be a tax lot number. Legal descriptions may be obtained from the county assessor's office. *The NOMA shall be printed on legal-sized (8 ½ x 14) paper to facilitate the recording process. If printed on smaller paper, additional recording fees may apply.*

2.) ***Operations and Maintenance Agreement – (O&M Agreement):*** The completed Agreement must identify the owner's name, address, and phone number, the site address, financial method used to cover future operation and maintenance, and parties responsible for inspecting and maintaining the facility. The O&M Agreement does not need to be recorded.

3.) ***Stormwater Management Site Plan:*** A copy of the Stormwater Management Site Plan shall be attached to the O&M Agreement. The Plan must show the location of the facility(ies) on the site, the sources of runoff entering the facility, and the ultimate stormwater destination.

4.) ***Landscape Plan:*** A Landscape Plan (if separate from the Stormwater Management Site Plan) shall be attached to the O&M Agreement. The Plan must show the location, density, plant size, quantity, and species by scientific and common name.

5.) ***Stormwater Management Facility Inspection and Maintenance Log:*** Stormwater Management Facility Inspection and Maintenance Logs must be kept on file by the facility owner(s). Logs should note all inspection dates, the facility components that were inspected, and any maintenance or repairs made. The Facility-Specific O&M Plans can serve as a checklist for what should be included in the Log (e.g. the facility elements that need to be inspected, frequency of inspection, conditions that indicate maintenance is needed, etc.). Logs must include the information listed in the form included in this appendix. Logs must be retained on site for a minimum of two years.

6.) ***Facility Specific Operations and Maintenance Plans – (O&M Plan):*** O&M Plans provided in this packet identify the specific operations and maintenance activities that are required for each of the approved stormwater management facilities listed in Appendix D Stormwater Facility Details. The appropriate Plan must be attached to the O&M Agreement and submitted as part of the application process. Applicants may either select and use the pre-approved Facility Specific O&M Plans provided in this packet or prepare a Facility Specific O&M Plan that incorporates the specific activities that corresponds with their chosen type of stormwater facilities through a Type II review process. The Facility Specific O&M Plans do not have to be recorded. This allows the future stormwater management facility owner to submit operations and maintenance activity revisions to the City without the need to re-record the O&M Plans with the County.

The facility specific operations and maintenance activities for private facilities may be modified any time after permit issuance subject to mutual agreement by the City and owner, in writing. Modifying the operations and maintenance activities is optional, and is intended to give the owner an opportunity to adjust maintenance needs according to site-specific history and conditions. Modifications may require the owner to apply for concurrent modification of a prior land use approval. Proposed modifications to the O&M Plan must be submitted, along with an updated O&M Agreement, to the City for review and approval.

7.) Operations and Maintenance Plans for Proprietary Facilities: Proprietary O&M Plans for approved proprietary facilities must describe the inspection, cleaning, and operation and maintenance criteria for the facility and provide manufacturer's recommended maintenance if applicable.

Stormwater Management Facility

Inspection & Maintenance Log

STORMWATER MANAGEMENT FACILITY INSPECTION AND MAINTENANCE LOG
Property Address:
Inspection Date:
Inspection Time:
Inspected By:
Approximate Date/Time of Last Rainfall:
Type of Stormwater Management Facility:
Location of Facility on Site (in relation to buildings or other permanent structures):
Water levels and observations (ponded water (indicating poor soil permeability), oil sheen, smell, turbidity, etc.):
Sediment accumulation and/or areas of erosion? Record sediment removal/erosion repair:
Condition of vegetation? Record survival rates, invasive species present, number of dead plants, etc. Record any replacement of plants and type of management (mowing, weeding, etc.):
Condition of physical properties such as inlets, outlets, piping, fences, irrigation facilities, and side slopes? Record damaged items and replacement activities:
Presence of litter? Presence of insects or damage from animals? Record removal activities:
Identify safety hazards present. Record resolution activities:

Facility Specific

Operations & Maintenance Plans

FACILITY SPECIFIC OPERATIONS AND MAINTENANCE PLANS	
Eco-Roofs	
Contained Planters	
Permeable Pavement	
Swales (Vegetated, Grassy and Street)	
Level Spreaders	
Vegetated Filter Strips	
Stormwater Planters	
Rain Gardens	
Sand Filters	
Soakage Trenches	
Wet, Extended Wet, and Dry Ponds	
Constructed Treatment Wetlands	
Underground Detention Tanks, Vaults and Pipes	
Drywells	
Spill Control Manholes	

Eco-Roofs
Operations and Maintenance Plan

Eco-Roofs are lightweight vegetated roof systems used in place of conventional roofs that retain and filter stormwater and provide aesthetic and energy conservation benefits. All facility components, including soil substrate or growth medium, vegetation, drains, irrigation systems (if applicable), membranes, and roof structure shall be inspected for proper operations, integrity of the waterproofing, and structural stability throughout the life of the eco-roof. All elements shall be inspected once a month from April through September. The facility owner must keep a log, recording all inspection dates, observations, and maintenance activities. The following items shall be inspected and maintained as stated:

Soil Substrate/ Growing Medium shall be inspected for evidence of erosion from wind or water. If erosion channels are evident, they shall be stabilized with additional soil substrate/growth medium and covered with additional plants.

Structural Components shall be operated and maintained in accordance with manufacturer's requirements. Drain inlets shall be kept unrestricted.

- Inlet/outlet pipe shall be cleared when soil substrate, vegetation, debris or other materials clog the drains. Sources of sediment and debris shall be identified and corrected.
- Determine if drain pipe is in good condition and correct as needed.

Debris and Litter shall be removed to prevent clogging of drains and interference with plant growth.

Vegetation shall be maintained to provide 90% plant cover.

- During the Establishment Period, plants shall be replaced once per month as needed. During the long-term period, dead plants shall generally be replaced once per year in the fall months.
- Fallen leaves and debris from deciduous plant foliage shall be removed if build up occurs.
- Nuisance and prohibited vegetation shall be removed when discovered.
- Dead vegetation shall be removed and replaced with new plants.
- Weeding shall be manual with no herbicides or pesticides used. Weeds shall be removed regularly and not allowed to accumulate.
- Fertilization is not necessary and fertilizers shall not be applied.
- During drought conditions, mulch or shade cloth may be applied to prevent excess solar damage and water loss.
- Mowing of grasses shall occur as needed. Clippings shall be removed if build up occurs.

Irrigation can be accomplished either through hand watering or automatic sprinkler systems. If automatic sprinklers are used, manufacturers' instructions for operations and maintenance shall be followed.

- During the Establishment Period (1-3 years), water sufficient to assure plant establishment and not to exceed ¼ inch of water once every 3 days shall be applied.
- During the long-term period (3+ years), water sufficient to maintain plant cover and not to exceed ¼ inch of water once every 14 days shall be applied.

Spill Prevention measures from mechanical systems located on roofs shall be exercised when handling substances that can contaminate stormwater.

- Releases of pollutants shall be corrected as soon as identified.
- The presence of a green/eco roof does not waive requirements for containment of mechanical systems.

Training and/or written guidance information for operating and maintaining rooftop gardens shall be provided to all property owners and tenants. A copy of the O&M Plan shall be provided to all property owners and tenants.

Access and Safety to the eco-roof shall be safe and efficient.

- Egress and ingress routes shall be maintained to design standards. Walkways shall be clear of obstructions and maintained to design standards.

Aesthetics of the rooftop garden shall be maintained as an asset to the property owner and community.

- Evidence of damage or vandalism shall be repaired and accumulation of trash or debris shall be removed upon discovery.

Insects shall not be harbored on the eco-roof.

- Standing water creating an environment for development of insect larvae shall be eliminated by manual means. Chemical sprays shall not be used.

Contained Planters
Operations and Maintenance Plan

Contained planters are designed to intercept rainfall that would normally fall on impervious surfaces. In this respect, contained planters convert impervious surfaces to pervious surfaces, decreasing the amount of stormwater runoff from a site. Water should drain through the planter within 3-4 hours after a storm event. All facility components and vegetation shall be inspected for proper operations and structural stability. These inspections shall occur, at a minimum, quarterly for the first 2 years from the date of installation and 2 times per year thereafter. The facility owner must keep a log, recording all inspection dates, observations, and maintenance activities. The following items shall be inspected and maintained as stated:

Filter Media consisting of sand or topsoil shall allow stormwater to percolate uniformly through the planter.

- Planter shall be excavated and cleaned, and gravel or soil shall be replaced to correct low infiltration rates.
- Holes that are not consistent with the design and allow water to flow directly through the planter to the ground shall be plugged.
- Litter and debris shall be removed routinely (e.g., no less than quarterly) and upon discovery

Planter shall contain filter media and vegetation.

- Structural deficiencies in the planter including rot, cracks, and failure shall be repaired.

Planter Reservoir receives and detains storm water prior to infiltration. If water does not drain from reservoir within 3-4 hours of storm event, sources of clogging shall be identified and corrected. Topsoil may need to be amended with sand or replaced all together.

Vegetation shall be healthy and dense enough to provide filtering while protecting underlying soils from erosion.

- Mulch shall be replenished at least annually.
- Planter vegetation shall be irrigated to ensure survival.
- Vegetation or trees that limit access or interfere with planter operation shall be pruned or removed.
- Fallen leaves and debris from deciduous plant foliage shall be raked and removed.
- Nuisance and prohibited vegetation shall be removed when discovered. Invasive vegetation contributing up to 25% of vegetation of all species (measured in a 10 x 10 foot plot) shall be removed and replaced.
- Dead vegetation shall be removed to maintain less than 10% of area coverage or when planter function is impaired. Vegetation shall be replaced within a specific timeframe, e.g., 3 months, or immediately if required to maintain cover density and control erosion where soils are exposed.

Training and/or written guidance information for operating and maintaining planters shall be provided to all property owners and tenants. A copy of the O&M Plan shall be provided to all property owners and tenants.

Access to the stormwater planter shall be safe and efficient. Egress and ingress routes shall be maintained to design standards. Roadways shall be maintained to accommodate size and weight of vehicles, if applicable.

- Obstacles preventing maintenance personnel and/or equipment access to the planter shall be removed.
- Gravel or ground cover shall be added if erosion occurs, e.g., due to vehicular or pedestrian traffic.

Insects and Rodents shall not be harbored at the stormwater planter. Pest control measures shall be taken when insects/rodents are found to be present.

- Standing water creating an environment for development of insect larvae shall be eliminated.
- If a complaint is received or an inspection reveals that a stormwater facility is significantly infested with mosquitoes or other vectors, the property owner/owners or their designee may be required to eliminate the infestation at the City inspector's discretion. Control of the infestation shall be attempted by using first nonchemical methods and secondly, only those chemical methods specifically approved by the City's inspector. Acceptable methods include but are not limited to the following:

i. Installation of predacious bird or bat nesting boxes.
ii. Alterations of water levels approximately every 4 days in order to disrupt mosquito larval cycles.
iii. Stocking ponds and other permanent water facilities with fish or other predatory species.
iv. If non-chemical methods have proved unsuccessful, contact the City inspector prior to use of chemical methods such as the mosquito larvicides Bacillus thurengensis var. israeliensis or other approved larvicides. These materials may only be used with City inspector approval if evidence can be provided that these materials will not migrate off-site or enter the public stormwater system. Chemical larvicides shall be applied by a licensed individual or contractor.

- Holes in the ground located in and around the stormwater planter shall be filled and compacted.

Debris and Litter shall be removed to maintain soil health and to prevent interference with plant growth.

Permeable Pavement
Operations and Maintenance Plan

Permeable Pavement is a porous pavement surface with an underlying stone reservoir that temporarily stores surface runoff before infiltrating into the subsoil or being collected in underlying drain pipes and being discharged off-site. There are many types of permeable pavement including plastic rings planted with grass, stone or concrete blocks with pore spaces backfilled with gravel or sand, porous asphalt, and porous concrete. Permeable pavement accepts only precipitation, not stormwater runoff. All facility components, vegetation, and source controls shall be inspected for proper operations and structural stability, at a minimum, quarterly for the first 2 years from the date of installation, 2 times per year thereafter, and within 48 hours after each major storm event. The facility owner must keep a log, recording all inspection dates, observations, and maintenance activities. The following items shall be inspected and maintained as stated:

Surface: In most permeable pavement design, the pavement itself acts as pretreatment to the stone reservoir below. The surface shall be kept clean and free of leaves, debris, and sediment. The surface shall not be overlaid with an impermeable paving surface.

- Regular sweeping shall be implemented for porous asphalt or concrete systems. Vacuum sweeping is preferred and can greatly prolong the effective life of the pavement.

Overflows or Emergency Spillways are used in the event that the facility's infiltration capacity is exceeded. Overflow devices shall be inspected for obstructions or debris, which shall be removed upon discovery. Overflow or emergency spillways shall be capable of transporting high flows of stormwater to an approved stormwater receiving system.

- Sources of erosion damage shall be identified and controlled when native soil is exposed near the overflow structure.

Vegetation (where applicable) shall be healthy and dense enough to provide filtering while protecting underlying soils from erosion. Vegetation, such as trees and shrubs, should not be located in or around the permeable pavement because roots from trees can penetrate the pavement, and leaves from deciduous trees and shrubs can increase the risk of clogging the surface.

- Vegetation and large shrubs/trees that limit access or interfere with porous pavement operation shall be pruned.
- Fallen leaves and debris from deciduous plant foliage shall be raked and removed.
- Poisonous, nuisance, dead or odor producing vegetation shall be removed immediately.
- Grass shall be mowed to less than four inches and grass clippings shall be bagged and removed.
- Irrigation shall be provided as needed.

Source Control measures prevent pollutants from mixing with stormwater. Typical non-structural control measures include raking and removing leaves, street sweeping, vacuum sweeping, limited and controlled application of pesticides and fertilizers, and other good housekeeping practices.

Spill Prevention measures shall be exercised when handling substances that can contaminate stormwater. A spill prevention plan shall be implemented at all non-residential sites and in areas where there is likelihood of spills from hazardous materials. However, virtually all sites, including residential and commercial, present potential danger from spills. All homes contain a wide variety of toxic materials including gasoline for lawn mowers, antifreeze for cars, solvents, pesticides, and cleaning aids that can adversely affect stormwater if spilled. It is important to exercise caution when handling substances that can contaminate stormwater. Releases of pollutants shall be corrected as soon as identified. In addition, long term exposure to low levels of petroleum products, such as that form a leaky vehicle, can severely degrade the pavement.

Training and/or written guidance information for operating and maintaining permeable pavement shall be provided to all property owners and tenants. A copy of the O&M Plan shall be provided to all property owners and tenants.

Access to the permeable pavement shall be safe and efficient. Egress and ingress routes shall be maintained to design standards. Roadways shall be maintained to accommodate size and weight of vehicles, if applicable. Obstacles preventing maintenance personnel and/or equipment access to the porous pavement shall be removed. Gravel or ground cover shall be added if erosion occurs, e.g., due to

vehicular or pedestrian traffic.

Debris and Litter shall be removed to prevent clogging.

Insects and Rodents shall not be harbored at the permeable pavement. Pest control measures shall be taken when insects/rodents are found to be present.

- Standing water creating an environment for development of insect larvae shall be eliminated.
- If a complaint is received or an inspection reveals that a stormwater facility is significantly infested with mosquitoes or other vectors, the property owner/owners or their designee may be required to eliminate the infestation at the City inspector's discretion. Control of the infestation shall be attempted by using first non-chemical methods and secondly, only those chemical methods specifically approved by the City's inspector. Acceptable methods include but are not limited to the following:
  i. Installation of predacious bird or bat nesting boxes.
  ii. Alterations of pond water levels approximately every four days in order to disrupt mosquito larval development cycles.
  iii. Stocking ponds and other permanent water facilities with fish or other predatory species.
  iv. If non-chemical methods have proved unsuccessful, contact the City inspector prior to use of chemical methods such as the mosquito larvicides Bacillus thurengensis var. israeliensis or other approved larvicides. These materials may only be used with City inspector approval if evidence can be provided that these materials will not migrate off-site or enter the public stormwater system. Chemical larvicides shall be applied by a licensed individual or contractor.
- Holes in the ground located in and around the permeable pavement shall be filled and compacted.

If used at this site, the following will be applicable:

Signage may serve to educate people about the importance or function of the site's stormwater protection measures. It may also discourage behaviors that adversely affect stormwater protection measures. For example, if debris is a problem, a sign reminding people not to litter may partially solve the problem. Broken or defaced signs shall be replaced/repaired.

Placing of permeable pavement on site:

Permeable pavement should not be placed in any area where there is high likelihood of spills or contamination such as vehicle fueling areas, washing areas, loading docks, trash enclosures or material handling areas. Permeable pavement is not well suited to high traffic areas or areas where heavy vehicles will frequently travel. Such areas include parking lot lanes, entrance lanes and any areas subject to vehicle braking and turning movements. Parking lot stalls, emergency access areas and infrequently used areas are typically suitable for permeable pavement treatment.

Swales (Vegetated, Grassy and Street)
Operations and Maintenance Plan

Swales are vegetated or grassed open channels that trap pollutants by filtering and slowing flows, allowing particles to settle out. The swale should drain within 48 hours of a storm event. All facility components, vegetation, and source controls shall be inspected for proper operations and structural stability, at a minimum, quarterly for the first 2 years from the date of installation, 2 times per year thereafter, and within 48 hours after each major storm event. The facility owner must keep a log, recording all inspection dates, observations, and maintenance activities. The following items shall be inspected and maintained as stated:

Swale Inlet (such as curb cuts or pipes) shall maintain a calm flow of water entering the swale**.**

- Source of erosion shall be identified and controlled when native soil is exposed or erosion channels are forming.
- Sediment accumulation shall be hand-removed with minimum damage to vegetation using proper erosion control measures. Sediment shall be removed if it is more than 3" thick or so thick as to damage or kill vegetation.
- Inlet shall be cleared when conveyance capacity is plugged. Sources of sediment and debris shall be identified and corrected.
- Rock splash pads, spreaders and dissipaters shall be replenished to prevent erosion.

Side Slopes shall be maintained to prevent erosion that introduces sediment into the swale.

- Slopes shall be stabilized and planted using appropriate erosion control measures when native soil is exposed or erosion channels are forming.

Swale Media shall allow stormwater to percolate uniformly through the landscape swale. If the swale does not drain within 48 hours, it shall be tilled and replanted according to design specifications.

- Swale area shall be protected during construction from compaction.
- Annual or semi-annual tilling shall be implemented if compaction or clogging continues.
- Debris in quantities that inhibit operation shall be removed routinely (e.g., no less than quarterly), or upon discovery.

Swale Outlet shall maintain sheet flow of water exiting swale unless a collection drain is used. Source of erosion damage shall be identified and controlled when native soil is exposed or erosion channels are forming.

- Outlets such as drains and overland flow paths shall be cleared when 50% of the conveyance capacity is plugged.
- Outlet structures shall be cleaned of sediment and debris at least 1 time per year or when the level is at 50% of the conveyance capacity.
- Sources of sediment and debris shall be identified and corrected.

Vegetation shall be healthy and dense enough (at least 90% cover) to provide filtering while protecting underlying soils from erosion. Mulch shall be replenished as needed to ensure survival of vegetation.

- Vegetation, large shrubs or trees that interfere with landscape swale operation shall be pruned.
- Fallen leaves and debris from deciduous plant foliage shall be removed if build up is damaging vegetation.
- Grassy swales shall be mowed to keep grass 4” to 9” in height. Clippings shall be removed when possible, to remove pollutants absorbed in grasses, or when build up is damaging vegetation.
- Nuisance and prohibited vegetation (such as blackberries and English Ivy) shall be removed when discovered. Invasive vegetation contributing up to 25% of vegetation of all species shall be removed and replaced.
- Dead vegetation and woody material shall be removed to maintain less than 10% of area coverage or when swale function is impaired. Vegetation shall be replaced within 3 months, or immediately if required to maintain cover density and control erosion where soils are exposed.

Debris and Litter shall be removed to ensure stormwater conveyance and to prevent clogging of inlet and outlet drains and interference with plant growth.

Spill Prevention measures shall be exercised when handling substances that contaminate stormwater.

Releases of pollutants shall be corrected as soon as identified.

Training and/or written guidance information for operating and maintaining swales shall be provided to all property owners and tenants. A copy of the O&M Plan shall be provided to all property owners and tenants.

Access to the swale shall be safe and efficient. Egress and ingress routes shall be maintained to design standards. Roadways shall be maintained to accommodate size and weight of vehicles, if applicable.

- Obstacles preventing maintenance personnel and/or equipment access to the swale shall be removed.
- Gravel or ground cover shall be added if erosion occurs, e.g., due to vehicular or pedestrian traffic.

Insects and Rodents shall not be harbored in the swale. Pest control measures shall be taken when insects/rodents are found to be present.

- If a complaint is received or an inspection reveals that a stormwater facility is significantly infested with mosquitoes or other vectors, the property owner/owners or their designee may be required to eliminate the infestation at the City inspector's discretion. Control of the infestation shall be attempted by using first non-chemical methods and secondly, only those chemical methods specifically approved by the City's inspector. Acceptable methods include but are not limited to the following:
  i. Installation of predacious bird or bat nesting boxes.
  ii. Alterations of pond water levels approximately every four days in order to disrupt mosquito larval development cycles.
  iii. Stocking ponds and other permanent water facilities with fish or other predatory species.
  iv. If non-chemical methods have proved unsuccessful, contact the City inspector prior to use of chemical methods such as the mosquito larvicides Bacillus thurengensis var. israeliensis or other approved larvicides. These materials may only be used with City inspector approval if evidence can be provided that these materials will not migrate off-site or enter the public stormwater system. Chemical larvicides shall be applied by a licensed individual or contractor.
- Holes in the ground located in and around the swale shall be filled.

If used at this site, the following will be applicable:

Check Dams, flow spreaders and dissipaters shall control and distribute flow.

- Causes for altered water flow or short circuits shall be identified, and obstructions cleared upon discovery.
- Causes for channelization shall be identified and repaired.
- Systems shall remain free of sediment build up and debris.

Level Spreaders
Operations and Maintenance Plan

Level Spreaders are used to spread and disperse a concentrated flow thinly over a vegetated or forested riparian buffer or filter strip. Stormwater enters the spreader as a concentrated flow and discharges as sheet flow across a buffer area. All facility components and the vegetated buffer shall be inspected for proper operations and structural stability. These inspections shall occur, at a minimum, quarterly for the first 2 years from the date of installation, 2 times per year thereafter, and within 48 hours after each major storm event. The facility owner must keep a log, recording all inspection dates, observations, and maintenance activities. The following items shall be inspected and maintained as stated:

Level Spreader shall allow runoff to enter the vegetative filter as predominantly sheet flow.

- Source of erosion damage shall be identified and controlled when native soil is exposed or erosion channels are forming.
- Sediment build-up near or exceeding 2" in depth shall be removed.

Inlet shall assure unrestricted stormwater flow to the level spreader.

- Sources of erosion shall be identified and controlled when native soil is exposed or erosion channels are present.
- Sediment accumulation shall be hand-removed with minimum damage to vegetation using proper erosion control measures. Sediment shall be removed if it is more than 3 inches thick or so thick as to damage or kill vegetation.
- Inlet shall be cleared when conveyance capacity is plugged.
- Rock splash pads and dissipaters shall be replenished to prevent erosion.

Spreader lip shall allow water to exit the level spreader as sheet flow.

- Sources of erosion damage shall be identified and controlled when native soil is exposed or erosion channels are deeper than 2 inches.
- Outlet shall be cleared when 50% of the conveyance capacity is plugged. Sources of sediment and debris shall be identified and corrected.

Vegetated buffer shall be healthy and dense enough (at least 90% cover) to provide filtering while protecting underlying soils from erosion.

- Nuisance and prohibited vegetation (such as blackberries and English Ivy) shall be removed when discovered. Invasive vegetation contributing up to 25% of vegetation of all species shall be removed and replaced.
- Dead vegetation shall be removed to maintain less than 10% of area coverage or when vegetation function is impaired. Vegetation shall be replaced immediately to control erosion where soils are exposed and within 3 months to maintain cover density.

Spill Prevention measures shall be exercised when handling substances that contaminate stormwater. Releases of pollutants shall be corrected as soon as identified.

Training and/or written guidance information for operating and maintaining level spreaders shall be provided to all property owners and tenants. A copy of the O&M Plan shall be provided to all property owners and tenants.

Access to the level spreaders shall be safe and efficient. Egress and ingress routes shall be maintained to design standards. Obstacles preventing maintenance personnel and/or equipment access to the facility shall be removed.

Insects and Rodents shall not be harbored in the level spreader. Pest control measures shall be taken when insects/rodents are found to be present.

- If a complaint is received or an inspection reveals that a stormwater facility is significantly infested with mosquitoes or other vectors, the property owner/owners or their designee may be required to eliminate the infestation at the City inspector's discretion. Control of the infestation shall be attempted by using first non-chemical methods and secondly, only those chemical methods specifically approved by the City's inspector. Acceptable methods include but are not limited to the following:
  i. Installation of predacious bird or bat nesting boxes.

ii. Alterations of pond water levels approximately every four days in order to disrupt mosquito larval development cycles.

iii. If non-chemical methods have proved unsuccessful, contact the City inspector prior to use of chemical methods such as the mosquito larvicides Bacillus thurengensis var. israeliensis or other approved larvicides. These materials may only be used with City inspector approval if evidence can be provided that these materials will not migrate off-site or enter the public stormwater system. Chemical larvicides shall be applied by a licensed individual or contractor.

- Holes in the ground located in and around the level spreader shall be filled.

Vegetated Filter Strips
Operations and Maintenance Plan

Vegetated Filter Strips are gently sloped vegetated areas that stormwater runoff is directed to flow and filter through. Stormwater enters the filter as sheet flow from an impervious surface or is converted to sheet flow using a flow spreader. Flow control is achieved using the relatively large surface area and check dams. Pollutants are removed through infiltration and sedimentation. The vegetative filter should drain within 48 hours of storm event. All facility components and vegetation shall be inspected for proper operations and structural stability. These inspections shall occur, at a minimum, quarterly for the first 2 years from the date of installation, 2 times per year thereafter, and within 48 hours after each major storm event. The facility owner must keep a log, recording all inspection dates, observations, and maintenance activities. The following items shall be inspected and maintained as stated:

Flow Spreader shall allow runoff to enter the vegetative filter as predominantly sheet flow.

- Source of erosion damage shall be identified and controlled when native soil is exposed or erosion channels are forming.
- Sediment build-up near or exceeding 2 inch in depth shall be removed.

Filter Inlet shall assure unrestricted stormwater flow to the vegetative filter.

- Sources of erosion shall be identified and controlled when native soil is exposed or erosion channels are present.
- Sediment accumulation shall be hand-removed with minimum damage to vegetation using proper erosion control measures. ediment shall be removed if it is more than 2 inches thick or so thick as to damage or kill vegetation.
- Inlet shall be cleared when conveyance capacity is plugged.
- Rock splash pads shall be replenished to prevent erosion.

Filter Media shall allow stormwater to percolate uniformly through the vegetative filter.

- If the vegetative filter does not drain within 48 hours, it shall be re-graded and replanted according to design specifications. Established trees shall not be removed or harmed in this process.
- Debris in quantities more than 2 inch deep or sufficient to inhibit operation shall be removed routinely (e.g., no less than quarterly), or upon discovery.

Check Dams and Dissipaters shall direct and control flow.

- Causes for altered water flow and channelization shall be identified, and obstructions cleared upon discovery.
- Cracks, rot, and structural damage shall be repaired.

Filter Outlet shall allow water to exit the vegetative filter as sheet flow, unless a collection drainpipe is used.

- Sources of erosion damage shall be identified and controlled when native soil is exposed or erosion channels are deeper than 2 inches.
- Outlet shall be cleared when 50% of the conveyance capacity is plugged. Sources of sediment and debris shall be identified and corrected.

Vegetation shall be healthy and dense enough (at least 90% cover) to provide filtering while protecting underlying soils from erosion.

- Fallen leaves and debris from deciduous plant foliage shall be raked and removed if build up is damaging vegetation.
- Nuisance and prohibited vegetation (such as blackberries and English Ivy) shall be removed when discovered. Invasive vegetation contributing up to 25% of vegetation of all species shall be removed and replaced.
- Dead vegetation shall be removed to maintain less than 10% of area coverage or when vegetative filter function is impaired. Vegetation shall be replaced immediately to control erosion where soils are exposed and within 3 months to maintain cover density.

Debris and Litter shall be removed to ensure stormwater conveyance and to prevent clogging of inlet and outlet drains and interference with plant growth.

Spill Prevention measures shall be exercised when handling substances that contaminate stormwater.

Releases of pollutants shall be corrected as soon as identified.

Training and/or written guidance information for operating and maintaining vegetated filters shall be provided to all property owners and tenants. A copy of the O&M Plan shall be provided to all property owners and tenants.

Access to the vegetative filter shall be safe and efficient. Egress and ingress routes shall be maintained to design standards. Obstacles preventing maintenance personnel and/or equipment access to the facility shall be removed. Gravel or ground cover shall be added if erosion occurs, e.g., due to vehicular or pedestrian traffic.

Insects and Rodents shall not be harbored in the vegetated filter. Pest control measures shall be taken when insects/rodents are found to be present.

- If a complaint is received or an inspection reveals that a stormwater facility is significantly infested with mosquitoes or other vectors, the property owner/owners or their designee may be required to eliminate the infestation at the City inspector's discretion. Control of the infestation shall be attempted by using first non-chemical methods and secondly, only those chemical methods specifically approved by the City's inspector. Acceptable methods include but are not limited to the following:
  i. Installation of predacious bird or bat nesting boxes.
  ii. Alterations of pond water levels approximately every four days in order to disrupt mosquito larval development cycles.
  iii. Stocking ponds and other permanent water facilities with fish or other predatory species.
  iv. If non-chemical methods have proved unsuccessful, contact the City inspector prior to use of chemical methods such as the mosquito larvicides Bacillus thurengensis var. israeliensis or other approved larvicides. These materials may only be used with City inspector approval if evidence can be provided that these materials will not migrate off-site or enter the public stormwater system. Chemical larvicides shall be applied by a licensed individual or contractor.
- Holes in the ground located in and around the vegetated filter shall be filled.

Stormwater Planters
Operations and Maintenance Plan

Stormwater Planters are designed to allow runoff to filter through layers of topsoil (thus capturing pollutants) and then either infiltrate into the native soils (infiltration planter) or be collected in a pipe to be discharged off-site (flow-through planter). The planter is sized to accept runoff and temporarily store the water in a reservoir on top of the soil. The flow-through planter is designed with an impervious bottom or is placed on an impervious surface. Water should drain through the planter within 3-4 hours after a storm event. All facility components and vegetation shall be inspected for proper operations and structural stability. These inspections shall occur, at a minimum, quarterly for the first 2 years from the date of installation, 2 times per year thereafter, and within 48 hours after each major storm event. The facility owner must keep a log, recording all inspection dates, observations, and maintenance activities. The following items shall be inspected and maintained as stated:

Downspout from rooftop or sheet flow from paving allows unimpeded stormwater flow to the planter.

- Debris shall be removed routinely (e.g., no less than every 6 months) and upon discovery.
- Damaged pipe shall be repaired upon discovery.

Splash Blocks prevent splashing against adjacent structures and convey water without disrupting media.

- Any deficiencies in structure such as cracking, rotting, and failure shall be repaired.

Planter Reservoir receives and detains storm water prior to infiltration. Water should drain from reservoir within 3-4 hours of storm event.

- Sources of clogging shall be identified and corrected to prevent short circuiting.
- Topsoil may need to be amended with sand or replaced all together to achieve a satisfactory infiltration rate.

Filter Media consisting of sand, gravel and topsoil shall allow stormwater to percolate uniformly through the planter. The planter shall be excavated and cleaned, and gravel or soil shall be replaced to correct low infiltration rates.

- Holes that are not consistent with the design and allow water to flow directly through the planter to the ground shall be plugged.
- Sediment accumulation shall be hand removed with minimum damage to vegetation using proper erosion control measures. Sediment shall be removed if it is more than 4 inches thick or so thick as to damage or kill vegetation.
- Litter and debris shall be removed routinely (e.g., no less than quarterly) and upon discovery.

Planter shall contain filter media and vegetation.

- Structural deficiencies in the planter including rot, cracks, and failure shall be repaired.

Overflow Pipe safely conveys flow exceeding reservoir capacity to an approved stormwater receiving system.

- Overflow pipe shall be cleared of sediment and debris when 50% of the conveyance capacity is plugged.
- Damaged pipe shall be repaired or replaced upon discovery.

Vegetation shall be healthy and dense enough (at least 90% cover) to provide filtering while protecting underlying soils from erosion.

- Mulch shall be replenished at least annually.
- Vegetation, large shrubs or trees that limit access or interfere with planter operation shall be pruned or removed.
- Fallen leaves and debris from deciduous plant foliage shall be raked and removed if build up is damaging vegetation.
- Nuisance or prohibited vegetation shall be removed when discovered. Invasive vegetation contributing up to 25% of vegetation of all species shall be removed and replaced.
- Dead vegetation shall be removed to maintain less than 10% of area coverage or when planter function is impaired. Vegetation shall be replaced within a specific timeframe, e.g., 3 months, or immediately if required to maintain cover density and control erosion where soils are exposed.

Debris and Litter shall be removed to ensure stormwater infiltration and to prevent clogging of overflow

drains and interference with plant growth.

Spill Prevention measures shall be exercised when handling substances that contaminate stormwater. Releases of pollutants shall be corrected as soon as identified.

Training and/or written guidance information for operating and maintaining stormwater planters shall be provided to all property owners and tenants. A copy of the O&M Plan shall be provided to all property owners and tenants.

Access to the stormwater planter shall be safe and efficient. Egress and ingress routes shall be maintained to design standards. Roadways shall be maintained to accommodate size and weight of vehicles, if applicable.

- Obstacles preventing maintenance personnel and/or equipment access to the stormwater planter shall be removed.
- Gravel or ground cover shall be added if erosion occurs, e.g., due to vehicular or pedestrian traffic.

Insects and Rodents shall not be harbored in the stormwater planter. Pest control measures shall be taken when insects/rodents are found to be present.

- If a complaint is received or an inspection reveals that a stormwater facility is significantly infested with mosquitoes or other vectors, the property owner/owners or their designee may be required to eliminate the infestation at the City inspector's discretion. Control of the infestation shall be attempted by using first non-chemical methods and secondly, only those chemical methods specifically approved by the City's inspector. Acceptable methods include but are not limited to the following:
  i. Installation of predacious bird or bat nesting boxes.
  ii. Alterations of pond water levels approximately every four days in order to disrupt mosquito larval development cycles.
  iii. Stocking ponds and other permanent water facilities with fish or other predatory species.
  iv. If non-chemical methods have proved unsuccessful, contact the City inspector prior to use of chemical methods such as the mosquito larvicides Bacillus thurengensis var. israeliensis or other approved larvicides. These materials may only be used with City inspector approval if evidence can be provided that these materials will not migrate off-site or enter the public stormwater system. Chemical larvicides shall be applied by a licensed individual or contractor.
- Holes in the ground located in and around the stormwater planter shall be filled and compacted.

Rain Gardens
Operations and Maintenance Plan

A vegetated Infiltration Basin or rain garden is a vegetated depression created by excavation, berms, or small dams to provide for short-term ponding of surface water until it percolates into the soil. The basin shall infiltrate stormwater within 24 hours. All facility components and vegetation shall be inspected for proper operations and structural stability, at a minimum, quarterly for the first 2 years from the date of installation, 2 times per year thereafter, and within 48 hours after each major storm event. The facility owner must keep a log, recording all inspection dates, observations, and maintenance activities. The following items shall be inspected and maintained as stated:

Basin Inlet shall assure unrestricted stormwater flow to the vegetated basin.

- Sources of erosion shall be identified and controlled when native soil is exposed or erosion channels are present.
- Inlet shall be cleared when conveyance capacity is plugged.
- Rock splash pads shall be replenished to prevent erosion.

Embankment, Dikes, Berms and Side Slopes retain water in the infiltration basin.

- Structural deficiencies shall be corrected upon discovery:
  - Slopes shall be stabilized using appropriate erosion control measures when soil is exposed/ flow channels are forming.
  - Sources of erosion damage shall be identified and controlled.

Overflow or Emergency Spillway conveys flow exceeding reservoir capacity to an approved stormwater receiving system.

- Overflow shall be cleared when 25% of the conveyance capacity is plugged.
- Sources of erosion damage shall be identified and controlled when soil is exposed.
- Rocks or other armament shall be replaced when only one layer of rock exists.

Filter Media shall allow stormwater to percolate uniformly through the infiltration basin. If water remains 36-48 hours after storm, sources of possible clogging shall be identified and corrected.

- Basin shall be raked and, if necessary, soil shall be excavated, and cleaned or replaced.
- Infiltration area shall be protected from compaction during construction.

Sediment/ Basin Debris Management shall prevent loss of infiltration basin volume caused by sedimentation. Gauges located at the opposite ends of the basin shall be maintained to monitor sedimentation.

- Sediment and debris exceeding 3 inch in depth shall be removed every 2-5 years or sooner if performance is affected.

Debris and Litter shall be removed to ensure stormwater infiltration and to prevent clogging of overflow drains and interference with plant growth.

- Restricted sources of sediment and debris, such as discarded lawn clippings, shall be identified and prevented.

Vegetation shall be healthy and dense enough (at least 90% cover) to provide filtering while protecting underlying soils from erosion.

- Mulch shall be replenished as needed to ensure healthy plant growth
- Vegetation, large shrubs or trees that limit access or interfere with basin operation shall be pruned or removed.
- Grass shall be mowed to 4”-9” high and grass clippings shall be removed no less than 2 times per year.
- Fallen leaves and debris from deciduous plant foliage shall be raked and removed if build up is damaging vegetation.
- Nuisance or prohibited vegetation (such as blackberries or English Ivy) shall be removed when discovered. Invasive vegetation contributing up to 25% of vegetation of all species shall be removed.
- Dead vegetation shall be removed to maintain less than 10% of area coverage or when infiltration basin function is impaired. Vegetation shall be replaced within 3 months, or immediately if required to control erosion.

Spill Prevention measures shall be exercised when handling substances that contaminate stormwater. Releases of pollutants shall be corrected as soon as identified.

Training and/or written guidance information for operating and maintaining vegetated infiltration basins shall be provided to all property owners and tenants. A copy of the O&M Plan shall be provided to all property owners and tenants.

Access to the infiltration basin shall be safe and efficient. Egress and ingress routes shall be maintained to design standards. Roadways shall be maintained to accommodate size and weight of vehicles, if applicable.

- Obstacles preventing maintenance personnel and/or equipment access to the infiltration basin shall be removed.
- Gravel or ground cover shall be added if erosion occurs, e.g., due to vehicular or pedestrian traffic.

Insects and Rodents shall not be harbored in the infiltration basin. Pest control measures shall be taken when insects/rodents are found to be present.

- If a complaint is received or an inspection reveals that a stormwater facility is significantly infested with mosquitoes or other vectors, the property owner/owners or their designee may be required to eliminate the infestation at the City inspector's discretion. Control of the infestation shall be attempted by using first non-chemical methods and secondly, only those chemical methods specifically approved by the City's inspector. Acceptable methods include but are not limited to the following:
  i. Installation of predacious bird or bat nesting boxes.
  ii. Alterations of pond water levels approximately every four days in order to disrupt mosquito larval development cycles.
  iii. Stocking ponds and other permanent water facilities with fish or other predatory species.
  iv. If non-chemical methods have proved unsuccessful, contact the City inspector prior to use of chemical methods such as the mosquito larvicides Bacillus thurengensis var. israeliensis or other approved larvicides. These materials may only be used with City inspector approval if evidence can be provided that these materials will not migrate off-site or enter the public stormwater system. Chemical larvicides shall be applied by a licensed individual or contractor.
- Holes in the ground located in and around the infiltration basin shall be filled.

If used at this site, the following will be applicable:

Fences shall be maintained to preserve their functionality and appearance.

- Collapsed fences shall be restored to an upright position.
- Jagged edges and damaged fences shall be repaired or replaced.

Sand Filters
Operations and Maintenance Plan

Sand filters consist of a layer of sand in a structural box used to trap pollutants. The water filters through the sand and then flows into the surrounding soils or an underdrain system that conveys the filtered stormwater to a discharge point. All facility components, vegetation, and source controls shall be inspected for proper operations and structural stability. These inspections shall occur, at a minimum, quarterly for the first 2 years from the date of installation, and 2 times per year thereafter, and within 48 hours after each major storm event. The facility owner must keep a log, recording all inspection dates, observations, and maintenance activities. The following items shall be inspected and maintained as stated:

Filter Inlet shall allow water to uniformly enter the sand filter as calm flow, in a manner that prevents erosion.

- Inlet shall be cleared of sediment and debris when 40% of the conveyance capacity is plugged.
- Source of erosion damage shall be identified and controlled when native soil is exposed or erosion channels are forming.
- Sediment accumulation shall be hand-removed with minimum damage to vegetation using proper erosion control measures. Sediment shall be removed if it is more than 4 inches thick or so thick as to damage or kill vegetation.
- Rock splash pads shall be replenished to prevent erosion.

Reservoir receives and detains stormwater prior to infiltration. If water does not drain within 2-3 hours of storm event, sources of clogging shall be identified and correction action taken.

- Debris in quantities more than 1 cu ft or sufficient to inhibit operation shall be removed routinely (e.g., no less than quarterly), or upon discovery.
- Structural deficiencies in the sand filter box including rot, cracks, and failure shall be repaired upon discovery.

Filter Media shall allow to stormwater to infiltrate uniformly through the sand filter. If water remains 36-48 hours after storm, sources of possible clogging shall be identified and corrected.

- Sand filter shall be raked and if necessary, the sand/gravel shall be excavated, and cleaned or replaced.
- Sources of restricted sediment or debris (such as discarded lawn clippings) shall be identified and prevented.
- Debris in quantities sufficient to inhibit operation shall be removed no less than quarterly, or upon discovery.
- Holes that are not consistent with the design structure and allow water to flow directly through the sand filter to the ground shall be filled.
- The infiltration area shall be protected from compaction during construction.

Underdrain Piping (where applicable) shall provide drainage from the sand filter, and **Cleanouts** (where applicable) located on laterals and manifolds shall be free of obstruction, and accessible from the surface.

- Under-drain piping shall be cleared of sediment and debris when conveyance capacity is plugged. Cleanouts may have been constructed for this purpose.
- Obstructions shall be removed from cleanouts without disturbing the filter media.

Overflow or Emergency Spillway conveys flow exceeding reservoir capacity to an approved stormwater receiving system.

- Overflow spillway shall be cleared of sediment and debris when 50% of the conveyance capacity is plugged.
- Source of erosion damage shall be identified and controlled when erosion channels are forming.
- Rocks or other armament shall be replaced when sand is exposed and eroding from wind or rain.

Vegetation

- Vegetation, large shrubs or trees that limit access or interfere with sand filter operation shall be pruned.
- Fallen leaves and debris from deciduous plant foliage shall be raked and removed.
- Nuisance or prohibited vegetation (such as blackberries or English Ivy) shall be removed when discovered. Invasive vegetation contributing up to 25% of vegetation of all species shall be removed.

Debris and Litter shall be removed to ensure stormwater infiltration and to prevent clogging.

Spill Prevention measures shall be exercised when handling substances that contaminate stormwater. Releases of pollutants shall be corrected as soon as identified.

Training and/or written guidance information for operating and maintaining sand filters shall be provided to all property owners and tenants. A copy of the O&M Plan shall be provided to all property owners and tenants.

Access to the sand filter shall be safe and efficient. Egress and ingress routes shall be maintained to design standards. Roadways shall be maintained to accommodate size and weight of vehicles, if applicable.

- Obstacles preventing maintenance personnel and/or equipment access to the facility shall be removed.
- Gravel or ground cover shall be added if erosion occurs, e.g., due to vehicular or pedestrian traffic.

Insects and Rodents shall not be harbored in the sand filter. Pest control measures shall be taken when insects/rodents are found to be present.

- If a complaint is received or an inspection reveals that a stormwater facility is significantly infested with mosquitoes or other vectors, the property owner/owners or their designee may be required to eliminate the infestation at the City inspector's discretion. Control of the infestation shall be attempted by using first non-chemical methods and secondly, only those chemical methods specifically approved by the City's inspector. Acceptable methods include but are not limited to the following:
  i. Installation of predacious bird or bat nesting boxes.
  ii. Alterations of pond water levels approximately every four days in order to disrupt mosquito larval development cycles.
  iii. Stocking ponds and other permanent water facilities with fish or other predatory species.
  iv. If non-chemical methods have proved unsuccessful, contact the City inspector prior to use of chemical methods such as the mosquito larvicides Bacillus thurengensis var. israeliensis or other approved larvicides. These materials may only be used with City inspector approval if evidence can be provided that these materials will not migrate off-site or enter the public stormwater system. Chemical larvicides shall be applied by a licensed individual or contractor.
- Holes in the ground located in and around the infiltration basin shall be filled.

Soakage Trenches
Operations and Maintenance Plan

Soakage Trenches consist of drain rock and sand, and receive stormwater from roof downspouts and/or area drains. There are various components within the system – piping, silt basin and the trench itself. The **Conveyance Piping** consists of an inlet pipe (downspout or area drain), an outlet pipe located between the silt basin and the soakage trench, and a perforated pipe, located on top of the aggregate bed of the soakage trench. The **Silt Basin** is a structure receiving runoff from an inlet pipe and conveying it to the soakage trench. The silt basin serves as the pre-treatment system for the soakage trench, removing sediments and other debris that can impact its proper functioning. All facility components, vegetation, and source controls shall be inspected for proper operations and structural stability. These inspections shall occur, at a minimum, quarterly for the first two years from the date of installation, then two times per year afterwards, or within 48 hours after each major storm. The facility owner must keep a log, recording all inspection dates, observations, and maintenance activities. The following items shall be inspected and maintained as stated:

Soakage trench infiltration: If water is noticed on top of the trench within 48 hours of a major storm, the soakage trench may be clogged.

- Check for debris/sediment accumulation, rake and remove and evaluate upland causes (erosion, surface or roof debris, etc.
- Assess the condition of the aggregate and the filter fabric in the trench. If there is sediment in the aggregate, excavate and replace.
- If there is a tear in the filter fabric, repair or replace.
- The soakage trench area shall be protected from compaction during construction.

Conveyance Piping: If water ponds over the trench for more than 48 hours after a major storm and no other cause if identified, it may be necessary to remove the filter fabric to determine if the perforated pipe is clogged with sediment or debris.

- Any debris or algae growth located on top of the soakage trench should be removed and disposed of properly.
- If the piping has settled more than 1-inch, add fill material. If there are cracks or releases, replace or repair the pipe. If there are signs of erosion around the pipe, this may be an indication of water seeping due to a crack or break.

Silt Basin: If water remains in the soakage trench for 36-48 hours after storm, check for sediment accumulation in the silt basin

- If less than 50% capacity remains in the basin or 6” of sediment has accumulated, remove and dispose the sediment.

Spill Prevention*:* Virtually all sites, including residential and commercial, present dangers from spills. All homes contain a wide variety of toxic materials including gasoline for lawn mowers, antifreeze for cars, nail polish remover, pesticides, and cleaning aids that can adversely affect groundwater if spilled. It is important to exercise caution when handling substances that can contaminate stormwater.

- Activities that pose the chance of hazardous material spills shall not take place near soakage trenches.

A Shut-Off Valve or Flow-Blocking Mechanism may have been required with the construction of the soakage trench to temporarily prevent stormwater from flowing into it, in the event of an accidental material spill. This may also involve mats kept on-site that can be used to cover inlet drains in parking lots. The shut-off valve shall remain in good working order, or if mats or other flow-blocking mechanisms are used, they shall be kept in stock on-site.

Training and/or written guidance information for operating and maintaining soakage trenches shall be provided to all property owners and tenants. A copy of the O&M Plan shall be provided to all property owners and tenants.

Access to the soakage trench is required for efficient maintenance. Egress and ingress routes will be maintained to design standards at inspections.

Insects and Rodents shall not be harbored in the soakage trench. Pest control measures shall be taken when insects/rodents are found to be present.

- If a complaint is received or an inspection reveals that a stormwater facility is significantly infested

with mosquitoes or other vectors, the property owner/owners or their designee may be required to eliminate the infestation at the City inspector's discretion. Control of the infestation shall be attempted by using first non-chemical methods and secondly, only those chemical methods specifically approved by the City's inspector. Acceptable methods include but are not limited to the following:

i. Installation of predacious bird or bat nesting boxes.
ii. Alterations of pond water levels approximately every four days in order to disrupt mosquito larval development cycles.
iii. Stocking ponds and other permanent water facilities with fish or other predatory species.
iv. If non-chemical methods have proved unsuccessful, contact the City inspector prior to use of chemical methods such as the mosquito larvicides Bacillus thurengensis var. israeliensis or other approved larva ides. These materials may only be used with City inspector approval if evidence can be provided that these materials will not migrate off-site or enter the public stormwater system. Chemical larvicides shall be applied by a licensed individual or contractor.

- Holes in the ground located in and around the soakage trench shall be filled.

Wet, Extended Wet, and Dry Ponds
Operations and Maintenance Plan

Wet Ponds are constructed ponds with a permanent pool of water. Pollutants are removed from stormwater through gravitational settling and biologic processes. **Extended Wet Ponds** are constructed ponds with a permanent pool of water and open storage space above for retention or short-term detention of large storm events. Pollutants are removed from stormwater through gravitational settling and biologic processes. **Dry Ponds** are constructed ponds with temporary storage for the retention or detention of large storm events. The stormwater is stored and released slowly over a matter of hours. All facility components, vegetation, and source controls shall be inspected for proper operations and structural stability. These inspections shall occur, at a minimum, quarterly for the first 2 years from the date of installation, and 2 times per year thereafter, and within 48 hours after each major storm event. The facility owner must keep a log, recording all inspection dates, observations, and maintenance activities. The following items shall be inspected and maintained as stated:

Pond Inlet shall assure unrestricted stormwater flow to the wet pond.

- Inlet pipe shall be cleared when conveyance capacity is plugged. Sources of sediment and debris shall be identified and corrected.
- Determine if pipe is in good condition:
  - If more than 1 inch of settlement, add fill material and compact soils.
  - If alignment is faulty, correct alignment.
  - If cracks or openings exist indicated by evidence of erosion at leaks, repair or replace pipe as needed.

Forebay traps coarse sediments, reduces incoming velocity, and distributes runoff evenly over the wet pond. A minimum 1-foot freeboard shall be maintained.

- Sediment buildup exceeding 50% of the facility capacity shall be removed every 2-5 years or sooner if performance is being affected.

Embankment, Dikes, Berms and Side Slopes retain water in the wet pond.

- Slopes shall be stabilized using appropriate erosion control measures when native soil is exposed or erosion channels are forming.
- Structural deficiencies shall be corrected upon discovery:
  - If cracks exist, repair or replace structure.
  - If erosion channels deeper than 2 inches exist, stabilize surface. Sources of erosion damage shall be identified and controlled.

Control Devices (e.g., weirs, baffles, etc.) shall direct and reduce flow velocity. Structural deficiencies shall be corrected upon discovery:

- If cracks exist, repair or replace structure.

Overflow Structure conveys flow exceeding reservoir capacity to an approved stormwater receiving system.

- Overflow structure shall be cleared when 50% of the conveyance capacity is plugged. Sources of sediment and debris shall be identified and corrected.
- Sources of erosion damage shall be identified and controlled when native soil is exposed at the top of overflow structure or erosion channels are forming.
- Rocks or other armoring shall be replaced when only one layer of rock exists above native soil.

Sediment and Debris Management shall prevent loss of wet pond volume caused by sedimentation.

- Wet ponds shall be dredged when 1 foot of sediment accumulates in the pond.
- Gauges located at the opposite ends of the wet pond shall be maintained to monitor sedimentation. Gauges shall be checked 2 times per year.
- Sources of restricted sediment or debris, such as discarded lawn clippings, shall be identified and prevented.
- Debris in quantities sufficient to inhibit operation shall be removed routinely, e.g. no less than quarterly, or upon discovery.
- Litter shall be removed upon discovery.

Vegetation shall be healthy and dense enough to provide filtering while protecting underlying soils from erosion and minimizing solar exposure of open water areas.

- Mulch shall be replenished at least annually.
- Vegetation, large shrubs or trees that limit access or interfere with wet pond operation shall be pruned or removed.
- Grass (where applicable) shall be mowed to 4 inch-9 inch high and grass clippings shall be removed if build up is damaging vegetation.
- Fallen leaves and debris from deciduous plant foliage shall be raked and removed if build up is damaging vegetation.
- Nuisance or prohibited vegetation (such as blackberries or English Ivy) shall be removed when discovered. Invasive vegetation contributing up to 25% of vegetation of all species shall be removed and replaced.
- Dead vegetation shall be removed to maintain less than 10% of area coverage or when wet pond function is impaired. Vegetation shall be replaced within 3 months, or immediately if required to maintain cover density and control erosion where soils are exposed. If removing a dead or hazard tree a permit maybe required, contact the City's Public Works Department for details on tree removal.
- Vegetation producing foul odors shall be eliminated.

Spill Prevention measures shall be exercised when handling substances that can contaminate stormwater Releases of pollutants shall be corrected as soon as identified.

Training and/or written guidance information for operating and maintaining ponds shall be provided to all property owners and tenants. A copy of the O&M Plan shall be provided to all property owners and tenants.

Access to the wet pond shall be safe and efficient. Egress and ingress routes shall be maintained to design standards. Roadways shall be maintained to accommodate size and weight of vehicles, if applicable.

- Obstacles preventing maintenance personnel and/or equipment access to the wet pond shall be removed.
- Gravel or ground cover shall be added if erosion occurs, e.g., due to vehicular or pedestrian traffic.

Insects and Rodents shall not be harbored in the pond. Pest control measures shall be taken when insects/rodents are found to be present.

- If a complaint is received or an inspection reveals that a stormwater facility is significantly infested with mosquitoes or other vectors, the property owner/owners or their designee may be required to eliminate the infestation at the City inspector's discretion. Control of the infestation shall be attempted by using first non-chemical methods and secondly, only those chemical methods specifically approved by the City's inspector. Acceptable methods include but are not limited to the following:
  i. Installation of predacious bird or bat nesting boxes.
  ii. Alterations of pond water levels approximately every four days in order to disrupt mosquito larval development cycles.
  iii. Stocking ponds and other permanent water facilities with fish or other predatory species.
  iv. If non-chemical methods have proved unsuccessful, contact the City inspector prior to use of chemical methods such as the mosquito larvicides Bacillus thurengensis var. israeliensis or other approved larvicides. These materials may only be used with City inspector approval if evidence can be provided that these materials will not migrate off-site or enter the public stormwater system. Chemical larvicides shall be applied by a licensed individual or contractor.
- Holes in the ground located in and around the pond shall be filled.

If used at this site, the following will be applicable:

Signage shall clearly convey information.

- Broken or defaced signs shall be replaced or repaired.

Fences shall be maintained to preserve their functionality and appearance.

- Collapsed fences shall be restored to an upright position.
- Jagged edges and damaged fences and shall be repaired or replaced.

Constructed Treatment Wetlands
Operations and Maintenance Plan

Constructed Treatment Wetlands remove pollutants through several processes: sedimentation, filtration, and biological processes. All facility components, vegetation, and source controls shall be inspected for proper operations and structural stability. These inspections shall occur, at a minimum, quarterly for the first 2 years from the date of installation, and 2 times per year thereafter, and within 48 hours after each major storm event. The facility owner must keep a log, recording all inspection dates, observations, and maintenance activities. The following items shall be inspected and maintained as stated:

Wetland Inlet shall assure unrestricted stormwater flow to the wetland.

- Inlet pipe shall be cleared when conveyance capacity is plugged. Sources of sediment and debris shall be identified and corrected.
- Determine if pipe is in good condition:
  - If more than 1 inch of settlement, add fill material and compact soils.
  - If alignment is faulty, correct alignment.
  - If cracks or openings exist indicated by evidence of erosion at leaks, repair or replace pipe as needed.

Forebay traps coarse sediments, reduces incoming velocity, and distributes runoff evenly over the wetland. A minimum 1-foot freeboard shall be maintained.

- Sediment buildup exceeding 50% of the facility capacity shall be removed every 2-5 years or sooner if performance is being affected.

Embankment, Dikes, Berms and Side Slopes retain water in the wetland.

- Slopes shall be stabilized using appropriate erosion control measures when native soil is exposed or erosion channels are forming.
- Structural deficiencies shall be corrected upon discovery:
  - If cracks exist, repair or replace structure.
  - If erosion channels deeper than 2 inches exist, stabilize surface. Sources of erosion damage shall be identified and controlled.

Control Devices (e.g., weirs, baffles, etc.) shall direct and reduce flow velocity.

- Structural deficiencies shall be corrected upon discovery:
  - If cracks exist, repair or replace structure.

Overflow Structure conveys flow exceeding reservoir capacity to an approved stormwater receiving system.

- Overflow structure shall be cleared when 50% of the conveyance capacity is plugged. Sources of sediment and debris shall be identified and corrected.
- Sources of erosion damage shall be identified and controlled when native soil is exposed at the top of overflow structure or erosion channels are forming.
- Rocks or other armament shall be replaced when only one layer of rock exists above native soil.

Sediment and Debris Management shall prevent loss of wetland volume caused by sedimentation.

- Wetlands shall be dredged when 1 foot of sediment accumulates.
- Gauges located at the opposite ends of the wetland shall be maintained to monitor sedimentation. Gauges shall be checked 2 times per year.
- Sources of restricted sediment or debris, such as discarded lawn clippings, shall be identified and prevented.
- Debris in quantities sufficient to inhibit operation shall be removed routinely, e.g. no less than quarterly, or upon discovery.
- Litter shall be removed upon discovery.

Vegetation shall be healthy and dense enough to provide filtering while protecting underlying soils from erosion and minimizing solar exposure of open water areas.

- Mulch shall be replenished when needed.
- Vegetation, large shrubs or trees that limit access or interfere with wetland operation shall be pruned.
- Fallen leaves and debris from deciduous plant foliage shall be raked and removed.

- Nuisance or prohibited vegetation (such as blackberries or English Ivy) shall be removed when discovered. Invasive vegetation contributing up to 25% of vegetation of all species shall be removed and replaced.
- Dead vegetation shall be removed to maintain less than 10% of area coverage or when wetland function is impaired. Vegetation shall be replaced within 3 months, or immediately if required to maintain cover density and control erosion where soils are exposed.
- Vegetation producing foul odors shall be eliminated.

Spill Prevention measures shall be exercised when handling substances that can contaminate stormwater Releases of pollutants shall be corrected as soon as identified.

Training and/or written guidance information for operating and maintaining treatment wetlands shall be provided to all property owners and tenants. A copy of the O&M Plan shall be provided to all property owners and tenants.

Access to the wetland shall be safe and efficient. Egress and ingress routes shall be maintained to design standards. Roadways shall be maintained to accommodate size and weight of vehicles, if applicable.

- Obstacles preventing maintenance personnel and/or equipment access to the wetland shall be removed.
- Gravel or ground cover shall be added if erosion occurs, e.g., due to vehicular or pedestrian traffic.

Insects and Rodents shall not be harbored in the constructed treatment wetland. Pest control measures shall be taken when insects/rodents are found to be present.

- If a complaint is received or an inspection reveals that a stormwater facility is significantly infested with mosquitoes or other vectors, the property owner/owners or their designee may be required to eliminate the infestation at the City inspector's discretion. Control of the infestation shall be attempted by using first non-chemical methods and secondly, only those chemical methods specifically approved by the City's inspector. Acceptable methods include but are not limited to the following:
  i. Installation of predacious bird or bat nesting boxes.
  ii. Alterations of pond water levels approximately every four days in order to disrupt mosquito larval development cycles.
  iii. Stocking ponds and other permanent water facilities with fish or other predatory species.
  iv. If non-chemical methods have proved unsuccessful, contact the City inspector prior to use of chemical methods such as the mosquito larvicides Bacillus thurengensis var. israeliensis or other approved larvicides. These materials may only be used with City inspector approval if evidence can be provided that these materials will not migrate off-site or enter the public stormwater system. Chemical larvicides shall be applied by a licensed individual or contractor.
- Holes in the ground located in and around the constructed treatment wetland shall be filled.

If used at this site, the following will be applicable:

Signage shall clearly convey information.

- Broken or defaced signs shall be replaced or repaired.

Fences shall be maintained to preserve their functionality and appearance.

- Collapsed fences shall be restored to an upright position.
- Jagged edges and damaged fences and shall be repaired or replaced.

Underground Detention Tanks, Vaults and Pipes
Operations and Maintenance Plan

Underground Detention Tanks, Vaults, and Pipes are designed to fill with stormwater during large storm events, slowly releasing it over a number of hours. There are numerous components to each system. **Drain Inlet Pipes** convey stormwater into the detention facility. The **Detention Chamber** is the structure in which stormwater accumulates during a storm event. **Orifice Structure/ Outlet Drain Pipe** restricts the flow out of the detention chamber, allowing it to fill up and slowly drain out. The orifice structure is located at the downstream end of the detention chamber. Underground facilities shall be inspected quarterly and within 48 hours after each major storm event. The facility owner must keep a log, recording all inspection dates, observations, and maintenance activities. The following items shall be inspected and maintained as stated:

Proprietary Structures such as oil-water separators, sedimentation manholes, grit chambers, etc. are required to have an O&M plan submitted with material from the manufacturer for that specific product for the O&M Agreement.

- If such material is not available or satisfactory for maintenance needs, city staff will assist developer/property owner in preparing the O&M plan.

Drain Inlet Pipes shall be inspected for clogging or leaks where it enters the vault or basin during every inspection and cleanout.

- Debris/sediment that is found to clog the inlet shall be removed, and disposed of in accordance with applicable federal and state requirements.

Detention Chamber shall be inspected for cracks or damage during each inspection.

- The detention chamber shall be cleaned out yearly or after an inch of sediment has accumulated. If there is a valve on the outlet pipe it shall be closed otherwise the outlet shall be plugged prior to cleanout. Grit and sediment that has settled to the bottom of the chamber shall be removed during each cleaning.
- Water and sediment in the detention chamber shall be removed, and disposed of in accordance with regulations.
- Cleaning shall be done without use of detergents or surfactants. A pressure washer may be used if necessary.

Orifice Structure/ Outlet Drain Pipe shall be inspected for clogging during unit inspections/cleanouts.

- Debris/sediment that is found to clog the inlet shall be removed, and disposed of in accordance with applicable federal and state requirements.

Vegetation such as trees should not be located in or around the detention facility because roots from trees can penetrate the unit body, and leaves from deciduous trees and shrubs can increase the risk of clogging the intake pipe.

- Large shrubs or trees that are likely to interfere with detention facility operation shall be identified at each inspection then removed.

Source Control measures typically include structural and non-structural controls. Non-structural controls can include street sweeping and other good housekeeping practices. It is often easier to prevent pollutants from entering stormwater than to remove them.

- Source control measures shall be inspected and maintained (where applicable).

Spill Prevention procedures require high-risk site users to reduce the risk of spills. However, virtually all sites, including residential and commercial, present dangers from spills. Homes contain a wide variety of toxic materials including gasoline for lawn mowers, antifreeze for cars, pesticides, and cleaning aids that can adversely affect storm water if spilled. It is important for everyone to exercise caution when handling substances that can contaminate stormwater. Spill prevention procedures shall be implemented in areas where there is likelihood of spills from hazardous materials.

Training and/or written guidance information for operating and maintaining detention facilities shall be provided to all property owners and tenants. A copy of the O&M Plan shall be provided to all property owners and tenants.

Access to the detention facility is required for efficient maintenance. Egress and ingress routes shall be open and maintained to design standards.

Signage may serve to educate people about the importance or function of the site's stormwater protection measures. Signs may also discourage behavior that adversely impacts the stormwater protection measures and encourages behavior that enhances or preserves stormwater quality. If debris is a problem, a sign reminding people not to litter may partially solve the problem. Signage (where applicable) will be maintained and repaired as needed during or shortly after inspections.

Insects and Rodents shall not be harbored in the detention facility. Pest control measures shall be taken when insects/rodents are found to be present

- If a complaint is received or an inspection reveals that a stormwater facility is significantly infested with mosquitoes or other vectors, the property owner/owners or their designee may be required to eliminate the infestation at the City inspector's discretion. Control of the infestation shall be attempted by using first non-chemical methods and secondly, only those chemical methods specifically approved by the City's inspector. Acceptable methods include but are not limited to the following:
  i. Installation of predacious bird or bat nesting boxes.
  ii. Alterations of pond water levels approximately every four days in order to disrupt mosquito larval development cycles.
  iii. Stocking ponds and other permanent water facilities with fish or other predatory species.
  iv. If non-chemical methods have proved unsuccessful, contact the City inspector prior to use of chemical methods such as the mosquito larvicides Bacillus thurengensis var. israeliensis or other approved larvicides. These materials may only be used with City inspector approval if evidence can be provided that these materials will not migrate off-site or enter the public stormwater system. Chemical larvicides shall be applied by a licensed individual or contractor.
- Holes in the ground located in and around the detention facility shall be filled.

Drywells
Operations and Maintenance Plan

Drywells are designed to infiltrate stormwater into the ground. Stormwater is piped to drywells from roof downspouts or pollution control facilities such as swales or planters. The pollution control facility is designed to settle out sediments and separate oils and greases from the water before releasing it through a pipe to the drywell. This prolongs the life of the drywell and helps to prevent the contamination of soils and groundwater. The drywell is a concrete or plastic manhole section with many small holes in the sides to allow stormwater to infiltrate into the surrounding soil. The drywell system shall be inspected and cleaned quarterly and within 48 hours after each major storm event. The facility owner must keep a log, recording all inspection dates, observations, and maintenance activities. Drywells are considered Underground Injection Wells in Oregon and are subject to State regulations for permitting and testing by the Oregon DEQ. The following items shall be inspected and maintained as stated:

Stormwater Drain Pipe shall be inspected for clogging or leaks where it enters the drywell.

- Debris/sediment that is found to clog the pipe shall be removed and disposed of in accordance with applicable federal and state requirements.

Drywell shall be inspected during each cleanout. Ponding around the catch basins or sedimentation manhole or drywell lids may indicate that the drywell is failing due to siltation, or the clogging of the sediment pores surrounding the drywell. Clogged drywells must be replaced.

Vegetation such as trees should not be located in or around the drywell because roots from trees can penetrate the unit body, and leaves from deciduous trees and shrubs can increase the risk of clogging the intake pipe.

- Large shrubs or trees that are likely to interfere with operation will be identified at each inspection and removed.

Source Control measures typically include structural and non-structural controls. Non-structural controls can include parking lot or street sweeping and other good housekeeping practices. It is often easier to prevent pollutants from entering stormwater than to remove them.

- Source control measures shall be inspected and maintained (where applicable).

Spill Prevention procedures require high-risk site users to reduce the risk of spills. However, virtually all sites, including residential and commercial, present dangers from spills. Homes contain a wide variety of toxic materials including gasoline for lawn mowers, antifreeze for cars, solvents, pesticides, and cleaning aids that can adversely affect storm water if spilled. It is important to exercise caution when handling substances that can contaminate stormwater. Spill prevention procedures shall be implemented in areas where there is likelihood of spills from hazardous materials.

A Shut-Off Valve or Flow-Blocking Mechanism may have been required with the construction of the drywell to temporarily prevent stormwater from flowing into it, in the event of an accidental material spill. This may also involve mats kept on-site that can be used to cover inlet drains in parking lots. The shutoff valve shall remain in good working order, or if mats or other flow-blocking mechanisms are used, they shall be kept in stock on-site.

Training and/or written guidance information for operating and maintaining drywell systems shall be provided to all property owners and tenants. A copy of the O&M Plan shall be provided to all property owners and tenants.

Access to the drywell is required for efficient maintenance. Egress and ingress routes shall be open and maintained to design standards.

- City inspection staff may require owners to provide proof of registration, permitting and maintenance logs for the facility as required by the Oregon DEQ.

Insects and Rodents shall not be harbored in the drywell. Pest control measures shall be taken when insects/rodents are found to be present.

- If a complaint is received or an inspection reveals that a stormwater facility is significantly infested with mosquitoes or other vectors, the property owner/owners or their designee may be required to eliminate the infestation at the City inspector's discretion. Control of the infestation shall be attempted by using first non-chemical methods and secondly, only those chemical methods specifically approved by the City's inspector. Acceptable methods include but are not limited to the

following:

i. Installation of predacious bird or bat nesting boxes.
ii. Alterations of pond water levels approximately every four days in order to disrupt mosquito larval development cycles.
iii. Stocking ponds and other permanent water facilities with fish or other predatory species.
iv. If non-chemical methods have proved unsuccessful, contact the City inspector prior to use of chemical methods such as the mosquito larvicides Bacillus thurengensis var. israeliensis or other approved larvicides. These materials may only be used with City inspector approval if evidence can be provided that these materials will not migrate off-site or enter the public stormwater system. Chemical larvicides shall be applied by a licensed individual or contractor.

- Holes in the ground located in and around the drywell shall be filled.

Signage may serve to educate people about the importance or function of the site's stormwater protection measures. Signs may also discourage behavior that adversely impacts the stormwater protection measures and encourages behavior that enhances or preserves stormwater quality. If debris is a problem, a sign reminding people not to litter may partially solve the problem. Signage (where applicable) shall be maintained and repaired as needed during or shortly after inspections.

Spill Control Manholes
Operations and Maintenance Plan

Spill Control Manholes operate using the principal that oil and water are immiscible (do not mix) and have different densities. Oil, being less dense than water, floats to the surface. The spill control manhole shall be inspected and cleaned quarterly. The facility owner must keep a log, recording all inspection dates, observations, and maintenance activities. The following items shall be inspected and maintained as stated:

Stormwater Drain Inlet Pipe shall be inspected for clogging or leaks where it enters the manhole during every inspection and cleanout. Debris/sediment that is found to clog the inlet shall be removed, tested, and disposed of in accordance with applicable federal and state requirements.

Manhole Chamber shall be inspected for cracks or damage during each inspection.

- The manhole shall be cleaned out quarterly. Cleanout shall be done in a manner to minimize the amount of trapped oil entering the outlet pipe. If there is a valve on the outlet pipe it shall be closed otherwise the outlet will be plugged prior to clean-out.
- Water and oil shall be removed, tested, and disposed of in accordance with regulations. Grit and sediment that has settled to the bottom of the chamber shall be removed during each cleaning
- Cleaning shall be done without use of detergents or surfactants. A pressure washer along with a vacuum may be used if necessary.

Absorbent Pillows and Pads (where applicable) absorb oil from the separation chamber.

- Replacement shall occur at least twice a year, in the spring and fall, or as necessary to retain oil-absorbing function.

Stormwater Drain Outlet Pipe shall be inspected for clogging or leaks where it exits the manhole. Particular attention shall be paid to ensure that the joint where the tee joins the outlet pipe is watertight.

- Debris/sediment that is found to clog the outlet shall be removed, tested, and disposed of in accordance with applicable federal and state requirements.

Vegetation such as trees should not be located in or around the spill control manhole because roots can penetrate the unit body, and leaves from deciduous trees and shrubs can increase the risk of clogging.

- Large shrubs or trees that are likely to interfere with manhole operation shall be identified at each inspection and removed.

Source Control measures typically include structural and non-structural controls. Non-structural controls can include street sweeping and other good housekeeping practices.

- Source control measures shall be inspected and maintained.

Spill Prevention procedures require high-risk site users to reduce the risk of spills. However, virtually all sites, including residential and commercial, present dangers from spills. Homes contain a wide variety of toxic materials including gasoline for lawn mowers, antifreeze for cars, pesticides, and cleaning aids that can adversely affect storm water if spilled. It is important to exercise caution when handling substances that can contaminate stormwater. Spill prevention procedures shall be implemented in areas where there is likelihood of spills from hazardous materials.

Training and/or written guidance information for operating and maintaining spill control manholes shall be provided to all property owners and tenants. A copy of the O&M Plan shall be provided to all property owners and tenants.

Access to the spill control manhole is required for efficient maintenance. Egress and ingress routes shall be open and maintained to design standards.

Insects and Rodents shall not be harbored in the spill control manhole. Pest control measures shall be taken when insects/rodents are found to be present.

- If a complaint is received or an inspection reveals that a stormwater facility is significantly infested with mosquitoes or other vectors, the property owner/owners or their designee may be required to eliminate the infestation at the City inspector's discretion. Control of the infestation shall be attempted by using first non-chemical methods and secondly, only those chemical methods specifically approved by the City's inspector. Acceptable methods include but are not limited to the following:

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- Holes in the ground located in and around the manhole shall be filled.

Signage may serve to educate people about the importance or function of the site's stormwater protection measures. Signage (where applicable) shall be maintained and repaired as needed during or shortly after inspections.

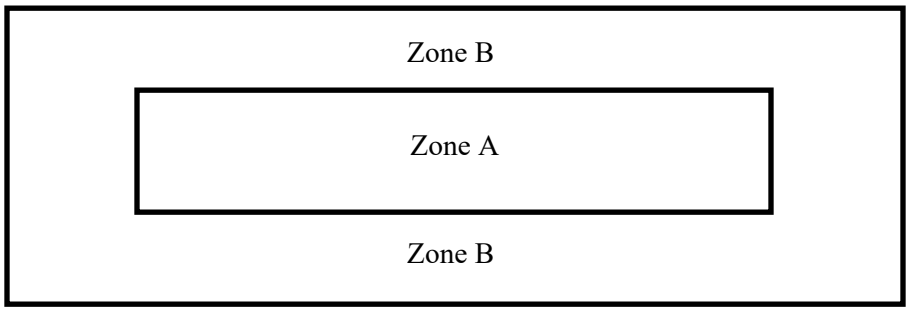
APPENDIX F – APPROVED VEGETATION LIST

Facility Planting Zones

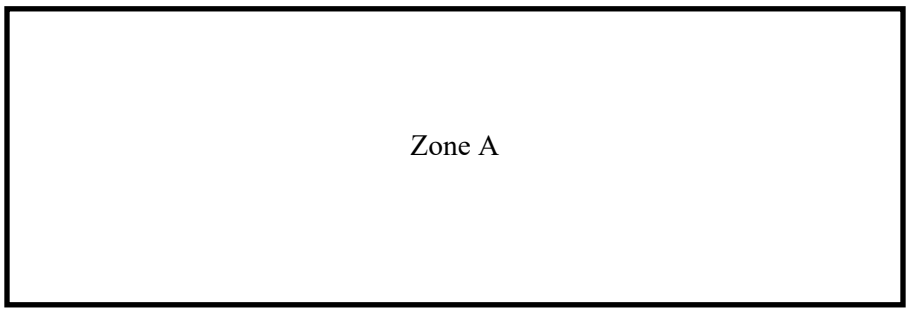
Zone A: Area of the facility defined as the bottom of the facility to the designated high-water mark. This area has wet to moist soils and plants located here shall be tolerant of mild inundation.

Zone B: Area of the facility defined as the side slopes from the designated high-water mark up to the edge of the facility. This area typically has drier to moist soils with the moist soils being located farther down the side slopes. Plants here should be drought tolerant and help stabilize the slopes.

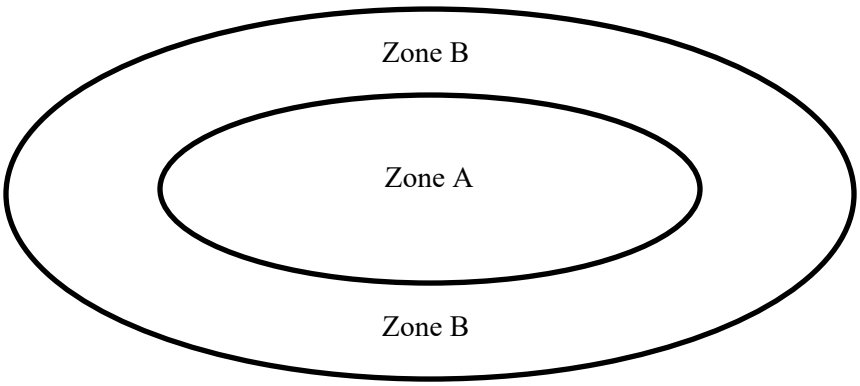
Swale Planting Zones



Planter Planting Zones



Rain Garden Planting Zones



Facility Plant List

Note: Alternative plants not found on this list may be approved based on ease of maintenance and beneficial impacts to water and soil quality. Non-native invasive plants are not allowed. Only native plants are allowed in stormwater facilities within Natural Resource Protection Area setbacks (SDC 4.3-117.F.4). Each stormwater facility must have a minimum of three unique species.

X = yes, blank = no

	Scientific Name *approved for public facilities	Common Name	Grassy Swales	Vegetated Swales/Filter Strips	Stormwater Planters	Rain Gardens/Dry Ponds	Wet/Extended Wet Ponds	Zone A (wet to moist soil)	Zone B (moist to dry soil)	NW Native	Groundcover	Evergreen	Potential Height	O.C. Spacing	Sun Exposure
Herbaceous Plants	*Agrostis exarata*	Spike Bentgrass	X					X		X			36”	Seed	Full to Part
	Alisma plantago-aquatica var. americanum	Water Plantain					X	X		X	X		24”	12”	Full
	Allium acuminatum	Hooker’s Onion	X				X	X		X			12”	12”	Full
	Allium amplectens	Slim Leaf Onion	X	X	X	X		X		X			12”	12”	Full
	Arctostaphylos uva-ursi*	**Kinnickinnick**		X		X	X		X	X	X	X	6”	12”	Full to Part
	Asclepias speciosa	Showy Milkweed	X	X	X	X	X	X	X	X			48”	36”	Full
	Aster hallii	Hall’s Aster	X	X		X			X	X			36”	18”	Full
	Aster suspicatus	Douglas Aster	X	X		X			X	X			36”	18”	Full
	Athyrium felix-femin	Lady Fern	X	X		X			X	X			36”	24”	Shade
	Beckmania syzigachne	American Slough Grass	X					X		X	X		36”	Seed 12”	Full
	Bidens cernua	Nodding Beggerticks					X	X	X	X			24”	12”	Full to Part
	Blechnum spicant	Deer Fern		X	X	X	X	X		X			24”	24”	Shade
	Brodiaea coronaria	Harvest Brodiaea			X	X				X	X		36”	12”	Full
	Bromus carinatus	California Brome Grass	X					X	X	X			18”	Seed	Full to Part
	Bromus sitchensis	Alaska Brome	X					X		X			18”	Seed	Full to Part
	Bromus vulgaris	Columbia Brome	X					X		X			18”	Seed	Full to Part
	Carex densa*	**Dense Sedge**		X	X	X	X	X		X	X		24”	12”	Full to Part

Herbaceous Plants	*Carex deweyanna*	Dewey Sedge		X	X		X	X		X	X		36”	12”	Part to Shade
	Carex hendersonii	Henderson Sedge		X				X		X	X	X	40”	12”	Full to Part
	Carex obnupta*	**Slough Sedge**		X	X	X	X	X		X	X	X	4’	12”	Full to Part
	Carex stipata*	**Sawbeak Sedge**		X	X	X	X	X		X	X		20”	12”	Full to Part
	Carex tumulicola*	**Foothill Sedge**		X	X	X	X	X		X	X	X	24”	12”	Full to Shade
	Carex unilateralis	Lateral Sedge		X	X	X	X	X		X	X		24”	12”	Full to Part
	Carex vesicaria	Inflated Sedge		X	X	X	X	X		X	X	X	36”	12”	Part
	Danthonia californica	California Oatgrass	X					X		X			18”	Seed 12”	Full to Part
	Deschampsia cespitosa	Tufted Hair Grass	X	X			X	X	X	X	X		36”	Seed 12”	Full to Part
	Eleocharis acicularis	Needle Spike Rush		X	X	X	X	X		X	X	X	30”	12”	Part
	Eleocharis ovata	Ovate Spike Rush	X	X	X	X	X	X		X	X	X	30”	12”	Part
	Eleocharis palustris	Creeping Spike Rush		X	X	X	X	X		X	X	X	30”	12”	Part
	Elymus glaucus	Blue Wild Rye	X					X	X	X			24”	Seed	Full to Part
	Eriophyllum lanatum	Oregon Sunshine		X		X	X	X	X	X			18”	12”	Full
	Festuca occidentalis	Western Fescue Grass	X					X		X			24”	Seed	Full to Part
	Festuca roemeri var. roemeri	Roemer’s Fescue	X	X		X		X	X	X	X		24”	Seed 12”	Full
	Festuca rubra	Red Fescue	X						X	X			24”	Seed	Full to Part
	Fragaria chiloensis*	**Coastal Strawberry**	X	X		X	X		X	X	X	X	6”	12”	Full to Part
	Fragaria vesca	Woodland Strawberry	X	X		X	X		X	X	X	X	6”	12”	Full to Part
	Fragaria virginiana	Wild Strawberry	X	X		X	X		X	X	X	X	6”	12”	Full to Part
	Glyceria occidentalis	Western Manna Grass	X					X		X			18”	Seed	Part
	Grindelia integrifolia	Gumweed		X			X	X		X	X		30”	12”	Full
	Hordeum brachyantherum	Meadow Barley	X					X		X			30”	Seed	Full
	Iris douglasiana*	**Douglas Iris**		X		X	X		X	X	X		18”	12”	Full to Part
	Iris tenax*	**Oregon Iris**		X		X	X		X	X	X		18”	12”	Full to Part
	Juncus acuminatus*	**Tapertip Rush**		X	X	X	X	X		X	X		24”	12”	Full
	Juncus balticus	Baltic Rush		X	X	X	X	X		X	X	X	20”	12”	Full to Part
	Juncus effusus	**Common/Soft**		X	X	X	X	X		X	X	X	36”	12”	Full to

	var. gracilis*	**Rush**													Part
	Juncus effusus var. pacificus*	**Common Rush**		X	X	X	X	X		X	X	X	36”	12”	Full to Part
	Juncus ensifolius*	**Dagger-leaf Rush**		X	X	X	X	X		X	X		10”	12”	Full to Part
	Juncus oxymeris	Pointed Rush	X	X	X	X	X	X		X	X	X	24”	12”	Full to Part
	Juncus patens*	**Spreading or Grooved Rush**		X	X	X	X	X		X	X	X	36”	12”	Full to Part
	Juncus tenuis	Slender Rush	X	X	X	X	X	X		X	X	X	36”	12”	Full to Part
	Koeleria macrantha	Junegrass	X					X	X	X			24”	Seed	Full
	Lupinus polyphyllus	Large-leaved Lupine	X	X		X	X	X	X	X			12”	12”	Full to Part
	Lupinus rivularis	Riverbank Lupine	X	X		X	X	X	X	X			36”	24”	Full
	Olsynium douglasii	Purple-eyed Grass	X	X	X	X	X	X		X			12”	24”	Full to Part
	Polystichum munitum	Sword Fern	X	X		X	X		X	X		X	24”	24”	Part to Shade
	Rubus calycinoides* (pentalobus)	**Creeping Bramble**	X	X	X	X	X		X		X	X		12”	Full to Part
	Sagittaria latifolia	Wapato					X	X		X			24”	12”	Full
	Solidago canadensis	Canada Goldenrod		X	X	X	X	X		X			4’	24”	Full to Part
	Schoenoplectus acutus var. acutus	Hardstem Bulrush					X	X		X	X	X	5’	12”	Full
Herbs	*Schoenoplectus americanus*	American Bulrush					X	X		X	X	X	7’	12”	Full
	Schoenoplectus microcarpus	Small Fruited Bulrush	X	X		X	X	X		X	X	X	24”	12”	Full to Part
	Schoenoplectus validus	Softstem Bulrush	X	X		X	X	X		X	X	X	5’	24”	Full to Part
	Sidalcea campestris	Meadow Sidalcea	X	X	X	X	X	X	X	X			36”	12”	Full to Part
	Sisyrinchium idahoense	Blue-eyed Grass	X	X	X	X	X	X	X	X			6”	12”	Full to Part
	Viola glabella	Stream Violet	X	X	X	X	X	X		X			4”	6”	Full to Part
Small Shrubs	***Cornus sericea* 'Kelseyii'***	**Kelsey Dogwood**		X	X	X	X		X				24”	24”	Full to Part
	Gaultheria shallon	Salal		X			X		X	X		X	24”	24”	Part
	Mahonia nervosa*	**Dull Oregon Grape**		X		X	X		X	X		X	24”	24”	Part
	Mahonia repens*	**Creeping Oregon Grape**		X		X	X		X	X		X	18”	18”	Part
	Spiraea betulifolia	Birchleaf Spiraea	X	X	X	X	X	X	X				3’	24”	Full to Part
	Spiraea spp.*	**Dwarf Spirea**	X	X	X	X	X		X				3’	3’	Full

	Symphoricarpos alba	Common Snowberry	X	X		X	X		X	X			4’	3’	Full to Part
Large Shrubs	*Ceanothus cuneatus*	Buckbrush	X	X		X	X	X		X		X	7’	7’	Full
	Ceanothus integerrimus	Deerbrush		X			X		X	X			13’	10’	Full to Part
	Ceanothus sanguineus	Oregon Redstem Ceanothus	X	X		X	X		X	X		X	7’	4’	Full
	Ceanothus velutinus	Snowbrush	X	X		X	X		X	X		X	5’	3’	Full
	Cornus sericea	Red-twig Dogwood	X	X	X	X	X	X	X	X			6’	6’	Full to Part
	Holodiscus discolor	Oceanspray	X	X		X	X		X	X			6’	6’	Full to Part
	Lonicera involucrata	Black Twinberry	X	X		X	X	X	X	X			5’	4’	Full to Part
	Mahonia (Berberis) aquifolium	Tall Oregon Grape	X	X		X	X		X	X		X	5’	3’	Full to Part
Large Shrubs	*Morella (Myrica) californica*	Pacific Wax Myrtle	X	X		X	X	X	X	X		X	10’	10’	Full to Part
	Oemleria cerasiformis	Osoberry	X	X		X	X		X	X			6’	4’	Full to Part
	Philadelphus lewisii	Wild Mock Orange	X	X		X			X	X			6’	4’	Full to Part
	Physocarpus capitatus	Pacific Ninebark	X	X	X	X	X	X	X	X			10’	5’	Full to Part
	Ribes sanguineum	Red-flowering Currant	X	X	X	X	X		X	X			8’	4’	Full to Part
	Rubus parviflorus	Thimbleberry	X	X	X	X	X	X	X	X			8’	4’	Full to Part
	Rubus spectabilis	Salmonberry	X	X	X	X	X	X		X			10’	4’	Full to Part
	Salix lucida var. 'Lasiandra'	Pacific Willow					X	X		X			13’	6’	Full
	Sambucus nigra ssp. cerulea	Blue Elderberry	X	X		X	X		X	X			10’	10’	Full to Part
	Sambucus racemosa	Red Elderberry	X	X		X	X		X	X			10’	10’	Full to Part
	Spiraea douglasii	Douglas Spiraea	X			X	X	X	X	X			7’	4’	Full to Part
	Viburnum edule	Highbush Cranberry		X		X	X	X	X	X			6’	6’	Full to Part
Tree	**Approved street tree species*														
	Abies koreana	Silver Korean Fir	X	X		X	X		X			X	50’		Full to Part
	**Acer circinatum*	Vine Maple	X	X	X	X	X	X	X	X			15’	10’	Full to Part
	**Acer griseum*	Paperbark Maple	X	X		X	X		X				30’		Full to Part
	Alnus rhombifolia	White Alder	X	X		X	X	X	X	X			100’		Full to Part
	Alnus rubra	Red Alder	X	X		X	X	X	X	X			80’		Full to

															Part
	Amelanchier alnifolia	Western (Saskatoon) Serviceberry	X	X		X	X		X	X			20’	10’	Full to Part
	**Amelanchier x grandiflora*	Apple Serviceberry	X	X		X	X		X				25’		Full to Part
	Arbutus x ‘Marina’	Marina Strawberry Tree	X	X		X	X		X			X	40’		Full to Part
Trees	*Arbutus menziesii*	Madrone	X	X		X	X		X	X		X	35’		Full
	**Arbutus unedo*	Strawberry Madrone	X	X		X	X		X				15’		Full
	**Carpinus betulus*	European Hornbeam		X		X	X		X				40’		Full
	**Celtis occidentalis*	Common Hackberry	X	X		X	X	X	X				100’		Full to Part
	Celtis reticulata	Netleaf Hackberry	X	X		X	X		X				25’		Full to Part
	**x Chitalpa tashkentensis*	Chitalpa	X	X		X	X		x				35’		Full to Part
	Cornus nuttalii (and hybrids)	Western Flowering Dogwood	X	X		X	X		X	X			20’		Full to Part
	Corylus cornuta	Western Beaked Hazelnut	X	X	X	X		X	X	X			15’		Full to Part
	Crataegus douglasii	Black Hawthorn		X			X	X		X			40’	10’	Full
	**Lagerstroemia indica x fauriei*	Crepe Myrtle	X	X		X	X		X				15’		Full
	Malus fusca	Pacific Crabapple	X	X		X	X	X		X			30’	10’	Full to Part
	**Nyssa sylvatica*	Black Tupelo	X	X		X	X		X				75’		Full to Part
	**Parrotia persica*	Persian Ironwood	X	X		X	X		X				50’		Full to Part
	**Pistacia chinesis*	Chinese Pistache	X	X		X			X				35’		Full
	**Quercus bicolor*	Swamp White Oak	X	X		X	X	X	X				60’		Full to Part
	**Quercus douglasii*	Blue Oak	X	X		X	X		X				80’		Full to Part
	**Quercus garryana*	Oregon White Oak	X	X		X	X		X	X			100’		Full to Part
	Quercus kelloggii	California Black Oak	X	X		X	X		X	X			100’	20’	Full to Part
	**Quercus shumardii*	Shumard Oak	X	X		X	X	X	X				60’		Full
	Quercus suber	Cork Oak	X	X		X	X		X			X	100’		Full
	Rhamnus purshiana	Cascara	X	X		X	X	X	X	X			30’		Full to Part
	Taxodium distichum	Bald Cypress	X	X		X	X		X				100’		Full

APPENDIX G

APPROVED STREET TREE LIST

APPENDIX G
APPROVED STREET TREE LIST

Street Trees for Under Powerlines	
Botanical Name	**Common Name**
Acer ginnala	Amur Maple
Acer Grandidentatum	Bigtooth Maple
Acer tartaricum	Tartarian Maple
Acer truncatum	Shantung Maple
Amelanchier arborea	Shadbush
Amelanchier x grandiflora 'var.'	'Autumn Brilliance' Serviceberry
Amelanchier x grandiflora 'var.'	'Robin Hill' Serviceberry
Amelanchier leavis	Smooth Shadbush, Smooth Serviceberry
Arbus unedo	Strawberry Tree
Carpinus Caroliana	American Hornbeam
Cercis	Redbud most varieties
Clerodendrum trichotomum	Glorybower Tree
Cornus florida	Flowering Dogwood
Cornus kousa	Korean Dogwood
Syringa reticulata 'var.'	'Summer Snow' Japanese Tree Lilac

Street Trees for Parking Strips 4 Feet to 6 Feet Wide	
Botanical Name	**Common Name**
Acer campestre	Hedge Maple
Acer campestre 'var.'	'Queen Elizabeth' Hedge Maple
Acer cappadocicum	Coliseum Maple
Acer grandidentatum	Bigtooth Maple
Acer griseum	Paperbark Maple
Acer platanoides 'var.'	'Olmsted' Norway Maple
Acer rubrum	Red Maple
Acer rubrum 'Armstrong'	'Armstrong' Red Maple
Acer rubrum 'var.'	'Autumn Flame' Red Maple
Acer rubrum 'var.'	'Bowhall' Red Maple
Acer rubrum 'var.'	'Karpick' Red Maple
Acer rubrum 'var.'	'October Glory' Red Maple
Acer rubrum 'var.'	'Red Sunset' Red Maple
Acer x freemanii 'var.'	'Armstrong II' Maple
Acer x freemanii 'var.'	'Autumn Blaze' Maple
Acer x freemanii 'var.'	'Autumn Fantasy' Maple
Acer x freemanii 'var.'	'Scarlet Sentinel' Maple
Aesculus x carnea 'var.'	'Briotti' Red Horsechestnut
Aesculus x carnea 'var.'	'Ft. McNair' Red Horsechestnut
Amelanchier x grandiflora	Serviceberry
Amelanchier x grandiflora 'var.'	'Cumulus' Serviceberry
Betula jacquemontii	Jacquemontii Birch
Carpinus betulus 'var.'	'Fastigiate' European Hornbeam
Carpinus carolinia	American Hornbeam
Celtis laevigata 'var.,'	'All Seasons' Sugar Hackberry
Celtis occidentalis	Hackberry
Celtis occidentalis 'var.'	'Chicagoland' Hackberry
Celtis occidentalis 'var.'	'Prairie Pride' Hackberry
Cercidiphyllum japonica	Katsura
Cercis canadensis	Redbud
Chionanthus virginicus	Fringe Tree
Chitalpa tashkentensis	Chitalpa
Cornus nuttallii	Pacific Dogwood
Koelreuteria paniculata	Goldenrain Tree
Ostrya virginiana	American Hop Hornbeam
Parrotia persica	Persian Parrotia

Street Trees for Parking Strips 6 Feet to 8 Feet Wide	
Botanical Name	**Common Name**
Acer campestre	Hedge Maple
Acer campestre 'var.'	'Queen Elizabeth' Hedge Maple
Acer cappadocicum	Coliseum Maple
Acer rubrum	Red Maple
Acer rubrum 'var.'	'Autumn Flame' Red Maple
Acer rubrum 'var.'	'Bowhall' Red Maple
Acer rubrum 'var.'	'Karpick' Red Maple
Acer rubrum 'var.'	'October Glory' Red Maple
Acer rubrum 'var.'	'Red Sunset' Red Maple
Acer saccharum	Sugar Maple
Acer saccharum 'var.'	'Legacy' Sugar Maple
Acer saccharum 'var.'	'Bonfire' Sugar Maple
Acer saccharum 'var.'	'Commemoration' Sugar Maple
Acer saccharum 'var.'	'Green Mountain' Sugar Maple
Acer saccharum 'var.'	'Seneca Chief' Sugar Maple
Acer truncatum x 'var.'	'Norwegian Sunset' Maple
Acer truncatum x 'var.'	'Pacific Sunset' Maple
Acer x freemanii 'var.'	'Autumn Blaze' Maple
Acer x freemanii 'var.'	'Autumn Fantasy' Maple
Acer x freemanii 'var.'	'Celebration' Maple
Acer x freemanii 'var.'	'Scarlet Sentinel' Maple
Aesculus hippocastanum 'var.'	'Bauman' Horsechestnut
Aesculus x carnea 'var.'	'Briotti' Red Horsechestnut
Aesculus x carnea 'var.'	'Ft. McNair' Red Horsechestnut
Castenea Dentata	Blight Resistant Chestnut
Carpinus betulus	European Hornbeam
Carpinus betulus 'var.'	'Fastigiate' European Hornbeam
Carpinus carolinia	American Hornbeam
Celtis laevigata 'var.,'	'All Seasons' Sugar Hackberry
Celtis occidentalis	Hackberry
Celtis occidentalis 'var.'	'Chicagoland' Hackberry
Celtis occidentalis 'var.'	'Prairie Pride' Hackberry

Street Trees for Parking Strips 6 Feet to 8 Feet Wide (continued)	
Botanical Name	**Common Name**
Ginkgo biloba	Ginkgo Male Only
Ginkgo biloba 'var.'	'Autumn Gold' Ginkgo Male only
Ginkgo biloba 'var.'	'Lakeview' Ginkgo Male only
Ginkgo biloba 'var.'	'Magyar' Ginkgo male only
Halesia carolina	Carolina Silverbell
Halesia monticola	Mountain Silverbell
Koelreuteria paniculata	Goldenrain Tree
Ostrya virginiana	American Hop Hornbeam
Quercus robur	English Oak
Quercus robur 'var.'	'Skymaster' English Oak
Quercus rubra	Northern Red Oak
Quercus garryana	Oregon White Oak
Quercus shumardii	Shumard Oak
Sophora japonica	Scholartree
Sophora japonica 'var.'	'Princeton Upright' Scholartree
Sophora japonica 'var.'	'Regent' Scholartree
Umbellularia californica	Oregon Myrtle
Zelkova serrata	Japanese Zelkova
Zelkova serrata 'var.'	'Green Vase' Japanese Zelkova
Zelkova serrata 'var.'	'Halka' Japanese Zelkova
Zelkova serrata 'var.'	'Village Green' Japanese Zelkova

Street Trees for Parking Strips 10 Feet Wide and Larger	
Botanical Name	**Common Name**
Acer macrophyllum	Bigleaf Maple
Acer nigrum	Black Maple
Acer pseudoplatanus	Sycamore Maple
Acer pseudoplatanus 'var.'	'Lustre' Sycamore Maple
Acer pseudoplatanus 'var.'	'Spaethii' Sycamore Maple
Acer saccharum	Sugar Maple
Acer saccharum 'var.'	'Legacy' Sugar Maple
Acer saccharum 'var.'	'Bonfire' Sugar Maple
Acer saccharum 'var.'	'Commemoration' Sugar Maple
Acer saccharum 'var.'	'Green Mountain' Sugar Maple
Acer saccharum 'var.'	'Seneca Chief' Sugar Maple
Aesculus hippocastanum 'var.'	'Bauman' Horsechestnut
Castenea dentata	Blight Resistant Chestnut
Carpinus betulus	European Hornbeam
Celtis laevigata	Sugar Hackberry
Cladrastis lutea	Yellowwood
Eucommia ulmoides	Hardy Rubber Tree
Ginkgo biloba	Ginkgo male only
Ginkgo biloba 'var.'	'Autumn Gold' Ginkgo male only
Ginkgo biloba 'var.'	'Lakeview' Ginkgo male only
Ginkgo biloba 'var.'	'Magyar' Ginkgo male only
Ginkgo biloba 'var.'	'Princeton Sentry' Ginkgo male only
Gymnocladus dioicus	Kentucky Coffeetree
Gymnoclaudus dioicus 'var.'	'Expresso' Kentucky Coffeetree
Halesia carolina	Carolina Silverbell
Liriodendron tulipifera	Tulip Tree
Lithocarpus densiflorus	Tanbark Oak
Magnolia grandiflora	Southern Magnolia
Nyssa sylvatica	Blackgum
Quercus bicolor	Swamp White Oak
Quercus coccinea	Scarlet Oak
Quercus douglassi	Blue Oak
Quercus lobata	Valley Oak
Quercus frainetto 'var.'	'Forest Green' Hungarian Oak
Quercus macrocarpa	Bur Oak
Quercus phellos	Willow Oak
Quercus robur	English Oak
Quercus robur 'var.'	'Skymaster' English Oak
Quercus rubra	Northern Red Oak
Quercus shumardii	Shumard Oak
Sophora japonica	Scholartree
Sophora japonica 'var.'	'Princeton Upright' Scholartree
Sophora japonica 'var.'	'Regent' Scholartree
Tilia americana	American Linden
Tilia americana 'var,'	'Redmond' American Linden

Street Trees for Parking Strips 10 Feet Wide and Larger	
Botanical Name	**Common Name**
Tilia americana 'var.'	'Legend' American Linden
Tilia tomentosa	Silver Linden
Tilia platyphyllos	Bigleaf Linden
Tilia x euchlora	Crimean Linden
Ulmus accolade	Accolade Elm Dutch elm disease tolerant only
Ulmus parvifolia	Chinese Elm Dutch elm disease tolerant only
Umbellularia californica	Oregon Myrtle
Zelkova serrata	Japanese Zelkova
Zelkova serrata 'var.'	'Green Vase' Japanese Zelkova
Zelkova serrata 'var.'	'Halka' Japanese Zelkova
Zelkova serrata 'var.'	'Village Green' Japanese Zelkova

APPENDIX H

Onsite Source Stormwater Controls

(A) Overview

(1) Some site characteristics and uses may generate specific pollutants that are not addressed solely through implementation of the stormwater quality measures identified in 4.3.110. The site characteristics and uses in this chapter have been identified as potential sources for chronic loadings or acute releases of pollutants such as oil and grease, toxic hydrocarbons, heavy metals, toxic compounds, solvents, abnormal pH levels, nutrients, organics, bacteria, chemicals, and suspended solids. This appendix presents source controls for managing these pollutants at their source.

(2) Industrial facilities may be subject to additional requirements through State of Oregon issued NPDES permits or as outlined in Oregon Administrative Rules (OAR) 340 Division 041.

(3) Springfield Municipal Code 4.372 lists prohibited discharges to the City's storm sewer system. The City has used these standards in the development of the listed source controls so stormwater discharges can better meet these criteria. The implementation of this chapter is in addition to the applicable water quality, flow control, and flood control requirements.

(4) Applicants may propose alternatives to the source controls identified in this chapter. Proposal of an alternative source control or alternative design element will require an additional review process and may delay issuance of related building or public works permits.

(B) Site Uses and Characteristics That Trigger Source Controls

(1) As provided in SDC 4.3.110(C)(8), development that includes any of the following uses and characteristics are subject to the design methodologies of this chapter:

(a) Fuel Dispensing Facilities and Surrounding Traffic Areas (Section C)

(b) Above-Ground Storage of Liquid Materials (Section D)

(c) Solid Waste Storage Areas, Containers, and Trash Compactors (Section E)

(d) Outdoor Storage of Bulk Materials (Section F)

(e) Material Transfer Areas/Loading Docks (Section G)

(f) Equipment and/or Vehicle Washing Facilities (Section H)

(g) Covered Vehicle Parking Areas (Section I)

Applicants are required to address all of the site characteristics and uses listed in Sections (C) through (I). For example, if a development includes both a fuel dispensing area and a vehicle washing facility, the source controls in both Sections (C) and (H) will apply.

(2) Source Control Goals and Objectives

(a) The specific source control standards are based on the following goals and objectives:

(i) Prevent stormwater pollution by eliminating pathways that may introduce pollutants into stormwater.

(ii) Protect soil, groundwater and surface water by capturing acute releases and reducing chronic contamination of the environment.

(iii) Direct wastewater discharges (including wash water) to a sanitary sewer system.

(iv) Direct areas that have the potential for acute releases or accidental spills, and are not expected to regularly receive flow or require water use (such as covered fuel islands or covered containment areas), to an approved method of containment or destination.

(v) Safely contain spills on-site, avoiding preventable discharges to sanitary sewer facilities, surface water bodies, or underground injection control structures (UICs).

(vi) Emphasize structural controls over operational procedures. Structural controls are not operator dependent and are considered to provide more permanent and reliable source control. Any proposals for operation-based source controls need to describe the long-term viability of the maintenance program.

(3) Signage

(a) Informational signage is required for certain site uses and activities that may pollute stormwater. Signage addresses good housekeeping rules and provides emergency response measures in case of an accidental spill. Required spill response supplies must be clearly marked, located where the signage is posted (or the location of the supplies must be

clearly indicated by the signage), and must be located near the high-risk activity area. Required spill response supplies, such as absorbent material and protective clothing, should be available at all potential spill areas. Employees must be familiar with the site's operations and maintenance plan and proper spill cleanup procedures.

(b) All signage must conform to the standards described below. Additional signage for specific activities is noted in applicable Sections C through I.

(c) Signs must be 8.5" x 11" or larger and located and plainly visible from all activity areas. More than one sign may be needed to accommodate larger activity areas. Signs must be water-resistant and include the following information:

(i) Safety precautions for self-protection and spill containment.

(ii) Immediate spill response procedures—for example: "Turn the valve located at..." or "Use absorbent materials"

(iii) Emergency contact(s) and telephone number(s)—for example: "Call 911" and "City of Springfield Public Works"

(C) Fuel Dispensing Facilities

(1) Fuel Dispensing Facilities include areas where fuel is transferred from bulk storage tanks to vehicles, equipment, and/or mobile containers (including fuel islands, above ground fuel tanks, fuel pumps, and the surrounding pad). This applies to large-sized gas stations as well as single-pump fueling operations.

(2) Cover

(a) The fuel dispensing area must be covered with a permanent canopy, roof, or awning so precipitation cannot come in contact with the fueling activity areas. Rainfall must be directed from the cover to an approved stormwater destination.

(b) Covers 10 feet high or less must have a minimum overhang of 3 feet on each side. The overhang must be measured relative to the perimeter of the hydraulically isolated fueling activity area/pad it is to cover.

(c) Covers higher than 10 feet must have a minimum overhang of 5 feet on each side. The overhang must be measured relative to the perimeter of the hydraulically isolated fueling activity area/pad it is to cover.

(3) Pavement

(a) A paved fueling pad must be placed under and around the fueling activity area with asphalt or concrete and must meet all applicable building code requirements.

(b) Sizing of the paved areas must be adequate to cover the activity area, including placement and number of the vehicles or pieces of equipment to be fueled by each pump.

(c) Fuel pumps must be located a minimum of seven feet from the edge of the fueling pad.

(4) Drainage

(a) The paved area beneath the cover must be hydraulically isolated through grading, berms, or drains. This will prevent uncontaminated stormwater from running onto the area and carrying pollutants away.

(b) Drainage from the hydraulically isolated area must be directed to an approved City sanitary sewer system, or authorized pretreatment facility.

(c) Surrounding runoff must be directed away from the hydraulically isolated fueling pad to a stormwater destination that meet all stormwater management practices of the Springfield Development code and other applicable code requirements.

(5) Signage

(a) Signage must be provided at the fuel dispensing area and must be plainly visible from all fueling activity areas.

(b) Signage must clearly specify the location of any applicable spill control kits, shut-off valves, etc. and include all necessary instructions for their use.

(6) Spill Control Manhole

(a) A spill control manhole must be installed on the discharge line of the fueling pad (before the domestic waste line tie-in).

(b) The tee section must extend 18 inches below the outlet elevation, with an additional 3 feet of dead storage volume below the tee to provide storage for oil and grease.

(c) The total containment volume must be no less than 110% the volume of the largest container or 10% of the total volume of product stored, whichever is larger.

(d) The manhole must be located on private property.

(7) Shut-Off Valves

(a) Shut-off valves are required to protect the City sewer systems or onsite infiltration facilities of spill risks from chemicals and other constituents that provide a danger for wide spread contamination, system damages or risk to the public health. Manual shut-off valves must not be permitted unless a request for an adjustment is approved by the City.

(b) Shut-off valves will be required in the following situations:

(i) Site or activity areas where corrosives or oxidizers are used or stored (for example, concentrated acids are corrosives having a pH of less than or equal to 5.0 and bases such as sodium or ammonium hydroxide having a pH of greater than or equal to 12.0, common oxidizers are hydrogen peroxide and bleach); or

(ii) Substances which are water soluble or float on water; or

(iii) Solvents and petroleum products

(c) Traffic pathways that surround the fueling pad, also designated as high-use/high-risk areas, will require a shut-off valve on the storm drainage system.

(i) Valves installed on storm drainage systems must be installed downstream of all private stormwater quality facilities to accommodate spill containment.

(ii) These valves should be left open to facilitate stormwater flows during normal conditions, and immediately closed in the event of a spill.

(iii) The switch or handle to operate the shut-off valve must be clearly marked and accessible, and identified on the signage at the fuel dispensing area. In the event of a spill the valve must remain closed until all spilled fuel and residue has been properly removed and disposed of.

(d) Fueling pads will require a shut-off valve downstream of the spill control manhole.

(i) Valves installed on sanitary sewer systems must be installed before the domestic waste line tie-in.

(ii) These valves must automatically revert to the closed position.

(iii) These valves must be kept closed, and opened only to allow incidental drainage activities that do not pose to be a threat or risk to the destination system.

(e) Shut-off valves must be located on private property and downstream of the exposed area's collection system.

(i) All valves must be installed and maintained as per manufacturer's recommendations. For more information about shut-off valves and associated valve boxes, contact Building & Permit Services at 541-682-5086.

(8) Additional Requirements

(a) Installation, alteration, or removal of above-ground fuel tanks larger than 55 gallons, and any related equipment, are subject to additional permitting requirements by the Springfield-Eugene Fire Marshal's Office. For technical questions and permitting, call the Fire Marshal's Office Permit Center at 541-682-5411, or visit them at Permit & Information Center, 99 W. 10th Avenue, Eugene, OR 97401.

(b) Bulk fuel terminals, also known as tank farms, will require the following:

(i) Secondary containment equal to 110 percent of the product's largest container or 10 percent of the total volume of product stored, whichever is larger.

(ii) A separate containment area for all valves, pumps and coupling areas with sub-bermed areas either in front of or inside the main containment areas. These sub-bermed areas are required to have rain shields and be directed to a City sanitary sewer destination that meets all applicable code requirements if no City sanitary sewer facility is available, drainage must be directed to a temporary holding facility for proper disposal.

(iii) An impervious floor within all containment areas. Floors must be sealed to prevent spills from contaminating the groundwater.

(iv) Truck loading and off-loading areas. These areas must follow cover, pavement, drainage, spill control, and shut-off valve requirements identified for fuel dispensing facilities.

(v) Shut-off valves installed for the drainage of the tank yard, must be installed downstream of the drainage system of the primary containment area, and kept closed. Valves installed for the drainage of the truck pad and sub-bermed containment areas must be installed on the sanitary sewer line downstream of the spill control manhole.

(vi) A batch discharge authorization before draining a containment area. This authorization will determine appropriate disposal methods, identify pretreatment requirements (if applicable), and authorize the discharge. Pretreatment may be required for oil and grease removal, and testing may be required to establish the specific characteristics of the discharge.

(c) Underground fuel tanks less than 4,000 gallons in size are subject to additional permitting requirements by Oregon's Department of Environmental Quality (DEQ) and tanks larger than 4,000 gallons are referred to the Federal Environmental Protection Agency (EPA). For technical questions and permitting, call DEQ's NW Region main office at 1-800-844-8467 and ask for the Underground Storage Tank Permitting Department.

(D) Above-ground Storage of Liquid Materials

(1) Above-Ground Storage of Liquid Materials include places where exterior storage (either permanent or temporary) of liquid chemicals, food products, waste oils, solvents, or petroleum products in above-ground containers, in quantities of 50 gallons or more exist.

(2) Containment

(a) Liquid materials must be stored and contained in such a manner that if the container(s) is ruptured, the contents will not discharge, flow, or be washed into a receiving system.

(b) A containment device and/or structure for accidental spills must have enough capacity to capture a minimum of 110 percent of the product's largest container or 10 percent of the total volume of product stored, whichever is larger. Containers, such as double-walled containers, with internal protection are considered to meet this requirement.

(3) Cover

(a) Storage containers (other than tanks) must be completely covered to prevent stormwater contact. Runoff must be directed from the cover to a stormwater destination that meets all applicable code requirements.

(b) Covers 10 feet high or less must have a minimum overhang of 3 feet on each side. The overhang must be measured relative to the perimeter of the hydraulically isolated activity area.

(c) Covers higher than 10 feet must have a minimum overhang of 5 feet on each side. The overhang must be measured relative to the perimeter of the hydraulically isolated activity area.

(2) Pavement

(a) All above ground storage of liquid material must occur in paved areas. The storage area must be paved with asphalt or concrete and must meet all applicable building code requirements. Sizing of the paved areas must be adequate to cover the area intended for storage.

(3) Drainage

(a) All paved storage areas must be hydraulically isolated through grading, berms, or drains to prevent uncontaminated stormwater run-on to a storage area.

(b) Covered storage areas:

(i) Significant amounts of precipitation are not expected to accumulate in covered storage areas, and drainage facilities are not required for the contained area beneath the cover.

(ii) If the applicant elects to install drainage facilities, the drainage from the hydraulically isolated area must be directed to a sanitary sewer destination that meets all applicable code criteria.

(c) Uncovered storage areas with containment:

(i) Water will accumulate in uncovered storage areas during and after rain. Any contaminated water cannot simply be drained from the area. It must be collected, inspected, and tested at the expense of the property owner before proper disposal can be determined.

(ii) Some type of monitoring may also be needed to determine the characteristics and level of contamination of the stormwater.

(d) All discharges to the sanitary sewer system must be considered batch discharges and must require approval and meet applicable code requirements.

(i) Pretreatment requirements must be set as part of the discharge approval process, based on the types and quantities of material to be discharged.

(ii) A discharge evaluation must be performed before connection to a sanitary sewer facility.

(iii) Testing may be required to establish characteristics of the sanitary sewer or contaminated stormwater and to verify that local

discharge limits are not exceeded. MWMC illicit discharge staff can be contacted to start this process.

(4) Signage

(a) Signage must be provided at the liquid storage area and must be plainly visible from all surrounding activity areas.

(E) Solid Waste Storage

(1) Solid Waste Storage Areas, Containers, and Trash Compactors include outdoor areas with one or more facilities that store solid waste (both food and non-food waste) containers.

(a) One- and two-family residential solid waste storage areas, containers, and trash compactors are exempt from this code subsection.

(b) Solid waste includes both food and non-food waste or recycling. Solid waste containers include compactors, dumpsters, compost bins, grease bins, recycling areas, and garbage cans.

(c) Debris collection areas used only for the storage of wood pallets or cardboard is excluded from these requirements.

(d) The following site uses and activities include all commercial and industrial development with facilities that store solid wastes, both food and non-food.

(i) Outdoor solid waste storage areas.

(ii) Multi-family residential sites if a shared trash collection area is proposed.

(iii) Activity areas used to collect and store refuse or recyclable materials, such as can or bottle return stations and debris collection areas.

(iv) Facilities whose business is to process and/or recycle wood pallets or cardboard.

(2) Design

(a) For approval of solid waste storage and handling activity areas in the City of Springfield, the following design requirements will apply. See below for a clarification of each requirement:

Activity/Use	Requirements

	Cover	Pavement	Hydraulicly Isolated	Sanitary Sewer Drain
Multi Residential (with shared trash areas)	X	X	X	X
Commercial	X	X	X	X
Industrial	X	X	X	X
Compactors (regardless of use)	X	X	X	X
Can and Bottle Return Stations	X	X	X	X

(3) Cover

(a) A permanent canopy, roof, or awning must be provided to cover the solid waste storage activity area and must be constructed to cover the activity area so rainfall cannot come in contact with the waste materials being stored. The cover must be sized relative to the perimeter of the hydraulically isolated activity area it is to cover. Runoff must be directed from the cover to a stormwater destination that meets all applicable code requirements.

(F) Outdoor Storage of Bulk Materials

Any bulk materials storage location that is not completely enclosed by a roof and sidewalls is an outdoor storage area.

(1) Bulk Materials Categories

(a) Bulk materials are separated into three categories based on risk assessments for each material stored: high-risk, low-risk, and exempt.

High-Risk Materials	Low-Risk Materials	Exempt Materials
• Recycling materials with potential effluent • Corrosive materials (e.g. lead-acid batteries) • Storage and processing of food items • Chalk/gypsum products • Feedstock/grain • Material by-products with potential effluent • Asphalt • Fertilizer	• Recycling materials without potential effluent • Scrap or salvage goods • Metal • Sawdust/bark chips • Sand/dirt/soil (including contaminated soil piles) • Material by-products without potential effluent • Unwashed gravel/rock • Composting Operations	• Washed gravel/rock • Finished lumber • Plastic products (hoses, gaskets, pipe, etc.) • Clean concrete products (blocks, pipe, etc.) • Glass products (new, non-recycled)

• Pesticides • Lime/lye/soda ash • Animal/human wastes • Treated Lumber		

(2) Cover

(a) Low-risk materials must be covered with a temporary plastic film or sheeting at a minimum.

(b) High-risk materials are required to be permanently covered with a canopy or roof to prevent stormwater contact and minimize the quantity of rainfall entering the storage area. Runoff must be directed from the cover to a stormwater destination that meets all applicable code requirements.

(c) Covers 10 feet high or less must have a minimum overhang of 3 feet on each side. The overhang must be measured relative to the perimeter of the hydraulically isolated activity area.

(d) Covers higher than 10 feet must have a minimum overhang of 5 feet on each side. The overhang must be measured relative to the perimeter of the hydraulically isolated activity area.

(3) Pavement

(a) Low-risk and exempt material storage areas are not required to be paved.

(b) High-risk material storage areas must be paved beneath the structural cover.

(4) Drainage

(a) Low-risk material storage areas are allowed in areas served by standard stormwater management systems. However, all erodible materials being stored must be protected from rainfall.

(b) If materials are erodible, a structural containment barrier must be placed on at least three sides of every stockpile to act as a barrier to prevent uncontaminated stormwater from running onto the storage area and carrying pollutants away.

(i) If the area under the stockpile is paved, the barrier can be constructed of asphalt berms, concrete curbing, or retaining walls.

(ii) If the area under the stockpile is unpaved, sunken retaining walls can be used. The applicant must clearly identify the method of containment on the building plans.

(c) For high-risk material storage areas, the paved area beneath the structural cover must be hydraulically isolated through grading, structural containment berms or walls, or perimeter drains to prevent runoff.

(i) Significant amounts of precipitation are not expected to accumulate in covered storage areas, and drainage facilities are not required for the containment area beneath the cover.

(ii) If the applicant elects to install drainage facilities, the drainage from the hydraulically isolated area must be directed to the City's sanitary sewer (with approval from the MWMC Illicit discharge division) and must meet all applicable code criteria.

(5) Additional Requirements

(a) Storage of pesticides and fertilizers may need to comply with specific regulations outlined by the Oregon Department of Environmental Quality (DEQ). For answers to technical questions, call DEQ's NW Region main office at 1-800-844-8467.

(b) A sampling manhole or other suitable stormwater monitoring access point may be required to monitor stormwater runoff from the storage area. This may apply to certain types of storage activities and materials or if an alternative source control is proposed. This requirement complies with Springfield Development Code 4.3.110D, which requires discharge to be treated. PW staff will review for applicability of this requirement.

(c) Signage must be provided at the storage area if hazardous materials or other materials of concern are stored. Signage must be located so it is plainly visible from all storage activity areas. More than one sign may be needed to accommodate large storage areas.

(d) If the applicant elects to install drainage facilities to the City's sanitary sewer system, a shut-off valve must be required for the structurally covered storage area.

(6) Alternative Protection Measures

(a) In lieu of covering mineral resource mining, recovery, stockpiling, and processing operations and low-risk material storage areas receiving land use approval, the applicant may propose alternative protection measures that demonstrate that stormwater runoff from the site will not contaminate adjoining properties, surface waters, and ground water as part of their land use application.

(G) Material Transfer Areas/Loading Docs

(1) Material Transfer Areas/Loading Docks include areas that are either interior or exterior to a building, designed to accommodate a commercial truck/trailer being backed up to or into them, and used specifically to receive or distribute materials to and/or from commercial trucks/trailers. Includes loading/unloading facilities with docks, and large bay doors without docks.

(a) These requirements also apply to all development proposing the installation of new material transfer areas or structural alterations to existing material transfer areas (e.g., access ramp regrading, leveler installations) with the following characteristics:

(i) The area is designed (size, width, etc.) to accommodate a commercial truck (1 ton and larger) or trailer being backed up to or into it; and

(ii) The area is designed so that it can be used to receive or distribute materials to and from trucks or trailers from any side.

(b) Two standard types of material transfer areas associated with buildings are:

(i) Loading/unloading facilities with docks

(ii) Large bay doors without docks

(c) The requirements in this section do not apply to material transfer areas or loading docks used only for mid-sized to small-sized passenger vehicles and areas restricted by lease agreements or other regulatory requirements to storing, transporting or using materials that are classified as domestic use, for example, primary educational facilities (elementary, middle or high schools), or buildings used for temporary storage, and churches.

(2) Cover

(a) The hydraulically isolated areas in front of loading docks are required to be permanently covered with a canopy or roof to prevent stormwater contact and to minimize the quantity of rainfall entering the loading dock area. Runoff must be directed from the cover to a stormwater destination that meets all applicable code requirements.

(b) Covers 10 feet high or less must have a minimum overhang of 3 feet on each side. The overhang must be measured relative to the perimeter of the hydraulically isolated activity area.

(c) Covers higher than 10 feet must have a minimum overhang of 5 feet on each side. The overhang must be measured relative to the perimeter of the hydraulically isolated activity area.

(3) Pavement

(a) A paved material transfer area must be placed underneath and around the loading and unloading activity area with asphalt or concrete that meets all applicable building code requirements. This will reduce the potential for soil contamination with potential impacts on groundwater and will help control any acute or chronic release of materials present in these areas.

(4) Drainage

(a) Loading Docks:

(i) Drainage from the hydraulically isolated area must be directed to a sanitary sewer that meets all applicable code requirements. Surrounding runoff and drainage from the access ramp must be directed away from the hydraulically isolated area to a stormwater destination that meets all applicable requirements of the Springfield Development Code.

(ii) The requirement for the drainage from the hydraulically isolated area of the loading dock to be directed to the City's sanitary sewer, or authorized pretreatment facility may be waived if PW determines there is no gravity sanitary sewer service available and an appropriately sized, underground temporary storage structure (such as a catch basin with no outlet or dead-end sump) is provided.

(5) Non-Gravity Option

(a) Activity areas that cannot achieve gravity sanitary sewer service may be allowed to install a pressurized (pumped) system. These types of installations will require the following to be provided at the time of building permit application:

(i) Proof that gravity sanitary sewer service cannot be obtained; and

(ii) Details of an electronic sump pump system equipped with a float switch

(b) Pressurized system installations are considered "permanent equipment" and deemed the property owner's liability in the event of system failure or if the property becomes vacated.

(c) The Building & Permit Services will review all sump pump or sewage ejector installations for compliance with Uniform Plumbing Code and Oregon State Plumbing Specialty Code.

(d) Bay Doors and Other Interior Transfer Areas: Because interior material transfer areas are not expected to accumulate precipitation, installation of floor drains is not required or recommended. It is preferable to handle these areas with a dry-mop or absorbent material. If interior floor drains are installed, they must be plumbed to the City's sanitary sewer facility or authorized pretreatment facility. Interior transfer areas may not be sloped to drain to the exterior of the building.

(e) Bay doors and other interior transfer areas must be designed so that stormwater runoff does not enter the building. This can be accomplished by grading or drains. Interior surfaces may not drain or be washed down to the exterior of the building.

(6) Signage

(a) Signage must be provided at the material transfer area and must be plainly visible from all surrounding activity areas.

(5) Additional Requirements

(a) Bay doors and other interior transfer areas must provide a 10-foot "no obstruction zone" beyond the entrance within the building. This will allow the transfer of materials to occur with the truck or trailer end placed at least 5 feet inside the building, with an additional staging area of 5 feet beyond that. The "no obstruction" zone must be clearly identified on the stormwater management plan and on the building plan at the time of the building permit application. The area must be identified at the facility by painting the "no obstruction zone" with bright or fluorescent floor paint.

(b) Shut-off valves will be required under the following situations:

(i) Site activity areas that are exposed to corrosives or oxidizers that can harm conveyance system components (such as battery acid).

(ii) Substances that do not settle or remain in one location, but are capable of being dissolved in or float on top of water (such as oil and grease). These substances can spread rapidly into downstream systems, causing widespread impacts and difficult clean-up situations.

(iii) Substances that are known to infiltrate through soils and contaminate groundwater.

(c) Valves located in material transfer areas are typically left open to facilitate drainage during normal conditions, and immediately closed in the event of a spill.

(d) Prior to transfer activities of harmful substances, the valves should be closed and only re-opened after the transfer is complete. The shut-off valves must be located on private property and downstream of the exposed area's collection system.

(H) Equipment and/or Vehicle Washing Facilities

(1) Equipment and/or Vehicle Washing Facilities include designated equipment and/or vehicle washing or steam cleaning areas, including smaller activity areas such as wheel washing stations.

(2) Cover

(a) The washing area must be covered with a permanent canopy or roof so precipitation cannot come in contact with the washing activity area. Precipitation must be directed from the cover to a stormwater destination that meets all applicable code requirements.

(b) Covers 10 feet high or less must have a minimum overhang of 3 feet on each side. The overhang must be measured relative to the perimeter of the hydraulically isolated washing activity area it is to cover.

(c) Covers higher than 10 feet must have a minimum overhang of 5 feet on each side. The overhang must be measured relative to the perimeter of the hydraulically isolated washing activity area it is to cover.

(3) Pavement

(a) A paved wash pad must be placed under and around the washing activity area with asphalt or concrete that meets all applicable building code requirements. Sizing of the paved area must adequately cover the activity area, including the placement of the vehicle or piece of equipment to be cleaned.

(4) Drainage

(a) The paved area beneath the cover must be hydraulically isolated through grading, berms, or drains to prevent uncontaminated stormwater from running onto the area and carrying pollutants away.

(b) Drainage from the hydraulically isolated area must be directed to the City's sanitary sewer, or authorized pretreatment facility.

(c) Surrounding runoff must be directed away from the hydraulically isolated washing pad to a stormwater destination that meets all applicable requirements of the Springfield Development Code.

(5) Oil Control

(a) All vehicle and equipment washing activities will be reviewed for needed oil controls to comply with the City's adopted plumbing code and Metropolitan Wastewater Management Commission requirements for pretreatment.

(b) The following design criteria are established for oil/water separators discharging to a sanitary sewer facility:

(i) Washing Areas Protected with a Cover or Located Inside a Structure:

Baffled oil/water separators and spill control (SC-Type) separators must not be allowed for use with equipment and/or vehicle washing applications.

Note: activities and processes of a washing facility change over time and the introduction of heat and surfactants may occur.

(ii) Coalescing plate separators must be designed to achieve 100 ppm non-polar oil and grease in the effluent from the peak flow generated by the washing activity. Testing information must be submitted by the manufacturer of the unit that supports the 100 ppm effluent standard at the calculated flow rate. Standard flow from a 5/8" hose is estimated to be 10 gpm. For specially designed washing units, check the vendor specifications for maximum flow rates.

(iii) Any pumping devices must be installed downstream of the separator to prevent oil emulsification.

(iv) Separator details must be shown on the building plans submitted for permit, and must match manufacturer specifications and details, including the unit flow rate, effluent water quality, and maximum process flow rate.

(c) On-site Wash Recycling Systems Wash may be used for oil control as long as they can meet effluent discharge limits for the City's sanitary sewer system. A detail of the wash recycling system and vendor

specifications identifying effluent efficiencies must be submitted as part of the building plans at the time of building permit application.

(l) Covered Vehicle Parking Structures

(1) Covered Vehicle Parking Structures include enclosed buildings, not including single-level covers such as canopies, overhangs, and carports, used to cover parked vehicles.

(2) Drainage

(a) Stormwater runoff from the top floor of a multi-level parking structure must be directed to a stormwater destination that meets all water quality requirements of the Springfield Development Code and any other applicable code requirements.

(b) Drainage from lower floor of a multi-level parking structure is not expected to accumulate significant amounts of precipitation runoff and drainage facilities are not required for the lower floors.

(c) If the applicant elects to install drainage facilities, the drainage from the lower floors must be directed to the sanitary sewer.

(3) Adjacent, Uncovered Portions of the Site

(a) The surrounding uncovered portions of the site must be designed so stormwater does not enter the covered parking areas. This can be accomplished through grading, drains, or exterior walls

Explanation of Appendices to the Springfield Development Code Appendix B Santa Barbara Urban Hydrograph to Incorporate MS4 Permit Requirements

PROPOSED AMENDMENTS

Various Sections of the Springfield Development Code (SDC) are amended to remove barriers to Low-Impact Development and define stormwater terms. This appendix is added to the Springfield Development Code to provide a hydrologic model for sites that are not suitable for a small site study. The proposed amendments are shown in legislative format (deleted text with strike-thru red font and new text with double underline red font). Commentary is shown in *purple italics font*, preceding the text to which it is referring.

APPENDIX B

SANTA BARBARA URBAN HYDROGRAPH METHOD

COMMENTARY: This appendix is what is required to generate a hydrologic model for sites that are not suitable for the small site study and is intended to be used by design professionals. This is the same method currently used by the City with updates to make it clearer than the current version in the Engineering Design and Standards and Procedures Manual (EDSPM). This was sourced from The City of Eugene Stormwater Management Manual.

Overview

(1) The Santa Barbara Urban Hydrograph (SBUH) method was developed by the Santa Barbara County Flood Control and Water Conservation District to determine a runoff hydrograph for an urbanized area.

(A) Elements Of the Santa Barbara Urban Hydrograph (SBUH) Method

(1) The SBUH method depends on several variables which must be included in the calculations submitted under SDC 4.3.110(G):

(a) Pervious (A_p) and impervious (A_{imp}) land areas

(b) Time of concentration (T_c) calculations

(c) Runoff curve numbers (CN) applicable to the site

(d) Design storm

COMMENTARY: The following elements are the standard inputs to most hydrologic models

(B) Land Area

(1) The total area, including the pervious and impervious areas within a drainage basin, shall be quantified in order to evaluate critical contributing areas and the resulting site runoff.

(2) Each area within a basin shall be analyzed separately and their hydrographs combined to determine the total basin hydrograph.

(3) Areas shall be selected to represent homogenous land use/development units.

COMMENTARY: Time of concentration is used to determine how intense the rainfall will be, and in most developed sites it will be less than 10 minutes.

(C) Time of Concentration

(1) Time of concentration, T_c, is the time for a theoretical drop of water to travel from the furthest point in the drainage basin to the facility being designed. (In this case, T_c is derived by calculating the overland flow time of concentration and the channelized flow time of concentration.) T_c depends on several factors, including ground slope, ground roughness, and distance of flow. The following formula for determining Tc is:

(a) Formulas

(i) $T_c = T_{t1} + T_{c2} + T_{c3} + \ldots + T_{cn}$

(ii) $T_t = L/60V$ (Conversion of velocity to travel time)

(iii) $T_t = (0.42\ (nL)^{0.8})/(158(s)^{0.4})$ (Manning's kinematic solution for sheet flow less than 300 feet)

(b) Shallow concentrated flow for slopes less than 0.005 ft/ft.:

(i) $V = 16.1345(s)^{0.5}$ (Unpaved surfaces)

(ii) $V = 20.3282(s)^{0.5}$ (Paved surfaces)

(c) Where,

(i) Tt = travel time, minutes

(ii) Tc = total time of concentration, minutes (minimum Tc = 5 minutes)

(iii) L = flow length, feet

(iv) V = average velocity of flow, feet per second

(v) n = Manning's roughness coefficient for various surfaces

(vi) s = slope of the hydraulic grade line (land or watercourse slope), feet per foot

(d) When calculating T_c, the following limitations apply:

(i) Overland sheet flow (flow across flat areas that does not form into channels or rivulets) shall not extend for more than 300 feet.

(ii) For flow paths through closed conveyance facilities such as pipes and culverts, standard hydraulic formulas shall be used for establishing velocity and travel time.

(iii) Flow paths through lakes or wetlands may be assumed to be zero (i.e., $T_c = 0$).

COMMENTARY: Curve numbers are used for all models that use a nonlinear hydrograph, and the values are industry standards that are commonly available. Generally, the higher the curve value the more runoff that surface generates.

Runoff curve numbers were developed by the Natural Resources Conservation Service (NRCS) after studying the runoff characteristics of various types of land. Curve numbers (CN) were developed to reduce diverse characteristics such as soil type, land usage, and vegetation into a single variable for doing runoff calculations.

(D) Runoff Curve Numbers

(1) The runoff curve numbers approved for water quantity/quality calculations are included as Table C-2 of this appendix.

(2) The curve numbers presented in Table C-2 are for wet antecedent moisture conditions. Wet conditions assume previous rainstorms have reduced the

capacity of soil to absorb water. Given the frequency of rainstorms in this area, wet conditions are most likely and give conservative hydrographic values.

COMMENTARY: Different design storms are based on the predominant weather pattern for that area and reflect how intense the storm and runoff will be.

(E) Design Storm

(1) The SBUH method also requires a design storm to perform the runoff calculations. For flow control calculations, use NRCS Type 1A 24-hour storm distribution. This storm is shown in Figure C-1 and Table C-4. The depth of rainfall for the 2 through 100-year storm events is shown below in Table C-1.

Table C-1
24-HOUR RAINFALL DEPTHS

Recurrence Interval, Years	2	5	10	25	100
Flood Control, Destination: 24-Hour Depths, Inches	3.12	3.6	4.46	5.18	6.48
Water Quality Storm – Pollution reduction: 24-Hour Depths, 1.4 Inches					

Table C-2 Runoff Curve Numbers					
Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition	A	B	C	D
Runoff curve numbers for urban areas*					
Open space (lawns, parks, golf courses, cemeteries, etc.):					
Grass cover <50%		68	79	86	89
Grass cover 50% to 75%)		49	69	79	84
Grass cover > 75%		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way) Urban districts:		72	82	87	89
Urban districts:					
Commercial and business		89	92	94	95
Industrial		81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)		77	85	90	92
1/4 acre		61	75	83	87
1/3 acre		57	72	81	86
1/2 acre		54	70	80	85
1 acre		51	68	79	84
2 acres		46	65	77	82
Runoff curve numbers for other agricultural lands*					
Pasture, grassland, or range-continuous forage for grazing					
<50% ground cover or heavily grazed with no mulch	Poor	68	79	86	89

50 to 75% ground cover and not heavily grazed	Fair	49	69	79	84
>75% ground cover and lightly or only occasionally grazed	Good	39	61	74	80
Meadow-continuous grass, protected from grazing and generally mowed for hay	-	30	58	71	78
<50% ground cover	Poor	48	67	77	83
50 to 75% ground cover	Fair	35	56	70	77
>75% ground cover	Good	30	48	65	73
Woods-grass combination (orchard or tree farm)	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods					
Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.	Poor	45	66	77	83
Woods are grazed but not burned, and some forest litter covers the soil.	Fair	36	60	73	79
Woods are protected from grazing, and litter and brush adequately cover the soil.	Good	30	55	70	77
Runoff curve numbers for Simplified Approaches**					
Eco-roof	Good	n/a	61	n/a	n/a
Roof Garden	Good	n/a	48	n/a	n/a
Contained Planter Box	Good	n/a	48	n/a	n/a
Infiltration & Flow-Through Planter Box	Good	n/a	48	n/a	n/a
Pervious Pavement	-	76	85	89	n/a
Trees					
New and/or Existing Evergreen	-	36	60	73	79
New and/or Existing	-	36	60	73	79
Deciduous					

n/a - Does not apply, as design criteria for the relevant mitigation measures do not include the use of this soil type.
*Soil Conservation Service, *Urban Hydrology for Small Watersheds*, Technical Release 55,

pp. 2.5-2.8, June 1986.
**CNs of various cover types were assigned to the Proposed Simplified Approaches with similar cover types as follows:

Eco-roof – assumed grass in good condition with soil type B.
Roof Garden – assumed brush-weed-grass mixture with >75% ground cover and soil type B. Contained Planter Box – assumed brush-weed-grass mixture with >75% ground cover and soil type B.
Infiltration & Flow-Through Planter Box – assumed brush-weed-grass mixture with >75% ground cover and soil type B.
Pervious Pavement – assumed gravel.
Trees – assumed woods with fair hydrologic conditions.

Note: To determine hydrologic soil type, consult local USDA Soil Conservation Service Soil Survey.

Table C-3 NRCS Hydrologic Soil Group Descriptions	
NRCS Hydrologic	
Soil Group	Description
Group A	Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist chiefly of deep, well drained to excessively drained sands or gravels. These soils have a high rate of water transmission.
Group B	Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.
Group C	Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils that have a layer that impedes the downward movement of water or soils that have a moderately fine texture. These soils have a slow rate of water transmission.
Group D	Soils having a very slow infiltrate rate (high runoff potential) when thoroughly wet. These consist chiefly of clay soils that have a high shrink-swell position, soils that have a permanent high water table, soils that have a fragipan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Table C-5 NRCS Type 1A Hyetographic Distribution - For Use In Water Quality/Quantity Design

Time From Start of Storm, Minutes		% Rainfall	Cumulative % Rainfall
0 -	10	0.40	0.40
10 -	20	0.40	0.80
20 -	30	0.40	1.20
30 -	40	0.40	1.60
40 -	50	0.40	2.00
50 -	60	0.40	2.40
60 -	70	0.40	2.80
70 -	80	0.40	3.20
80 -	90	0.40	3.60
90 -	100	0.40	4.00
100 -	110	0.50	4.50
110 -	120	0.50	5.00
120 -	130	0.50	5.50
130 -	140	0.50	6.00
140 -	150	0.50	6.50
150 -	160	0.50	7.00
160 -	170	0.60	7.60
170 -	180	0.60	8.20
180 -	190	0.60	8.80
190 -	200	0.60	9.40
200 -	210	0.60	10.00
210 -	220	0.60	10.60
220 -	230	0.70	11.30
230 -	240	0.70	12.00
240 -	250	0.70	12.70
250 -	260	0.70	13.40
260 -	270	0.70	14.10
270 -	280	0.70	14.80
280 -	290	0.82	15.62
290 -	300	0.82	16.44
300 -	310	0.82	17.26
310 -	320	0.82	18.08
320 -	330	0.82	18.90
330 -	340	0.82	19.72
340 -	350	0.95	20.67
350 -	360	0.95	21.62
360 -	370	0.95	22.57
370 -	380	0.95	23.52
380 -	390	0.95	24.47
390 -	400	0.95	25.42
400 -	410	1.34	26.76
410 -	420	1.34	28.10
420 -	430	1.34	29.44
430 -	440	1.80	31.24
440 -	450	1.80	33.04
450 -	460	3.40	36.44
460 -	470	5.40	41.84
470 -	480	2.70	44.54
480 -	490	1.80	46.34
490 -	500	1.34	47.68
500 -	510	1.34	49.02
510 -	520	1.34	50.36
520 -	530	0.88	51.24
530 -	540	0.88	52.12
540 -	550	0.88	53.00
550 -	560	0.88	53.88
560 -	570	0.88	54.76
570 -	580	0.88	55.64
580 -	590	0.88	56.52
590 -	600	0.88	57.40
600 -	610	0.88	58.28
610 -	620	0.88	59.16
620 -	630	0.88	60.04
630 -	640	0.88	60.92
640 -	650	0.72	61.64
650 -	660	0.72	62.36
660 -	670	0.72	63.08
670 -	680	0.72	63.80
680 -	690	0.72	64.52
690 -	700	0.72	65.24
700 -	710	0.72	65.96
710 -	720	0.72	66.68
720 -	730	0.72	67.40
730 -	740	0.72	68.12
740 -	750	0.72	68.84
750 -	760	0.72	69.56
760 -	770	0.57	70.13
770 -	780	0.57	70.70
780 -	790	0.57	71.27
790 -	800	0.57	71.84
800 -	810	0.57	72.41
810 -	820	0.57	72.98
820 -	830	0.57	73.55
830 -	840	0.57	74.12
840 -	850	0.57	74.69
850 -	860	0.57	75.26
860 -	870	0.57	75.83
870 -	880	0.57	76.40
880 -	890	0.50	76.90
890 -	900	0.50	77.40
900 -	910	0.50	77.90
910 -	920	0.50	78.40
920 -	930	0.50	78.90
930 -	940	0.50	79.40
940 -	950	0.50	79.90
950 -	960	0.50	80.40
960 -	970	0.50	80.90
970 -	980	0.50	81.40
980 -	990	0.50	81.90
990 -	1000	0.50	82.40
1000 -	1010	0.40	82.80
1010 -	1020	0.40	83.20
1020 -	1030	0.40	83.60
1030 -	1040	0.40	84.00
1040 -	1050	0.40	84.40
1050 -	1060	0.40	84.80
1060 -	1070	0.40	85.20
1070 -	1080	0.40	85.60
1080 -	1090	0.40	86.00
1090 -	1100	0.40	86.40
1100 -	1110	0.40	86.80
1110 -	1120	0.40	87.20
1120 -	1130	0.40	87.60
1130 -	1140	0.40	88.00
1140 -	1150	0.40	88.40
1150 -	1160	0.40	88.80
1160 -	1170	0.40	89.20
1170 -	1180	0.40	89.60
1180 -	1190	0.40	90.00
1190 -	1200	0.40	90.40
1200 -	1210	0.40	90.80
1210 -	1220	0.40	91.20
1220 -	1230	0.40	91.60
1230 -	1240	0.40	92.00
1240 -	1250	0.40	92.40
1250 -	1260	0.40	92.80
1260 -	1270	0.40	93.20
1270 -	1280	0.40	93.60
1280 -	1290	0.40	94.00
1290 -	1300	0.40	94.40
1300 -	1310	0.40	94.80
1310 -	1320	0.40	95.20
1320 -	1330	0.40	95.60
1330 -	1340	0.40	96.00
1340 -	1350	0.40	96.40
1350 -	1360	0.40	96.80
1360 -	1370	0.40	97.20
1370 -	1380	0.40	97.60
1380 -	1390	0.40	98.00
1390 -	1400	0.40	98.40
1400 -	1410	0.40	98.80
1410 -	1420	0.40	99.20
1420 -	1430	0.40	99.60
1430 -	1440	0.40	100.00

Explanation of Appendices to the Springfield Development Code Appendix C Infiltration Testing to Incorporate MS4 Permit Requirements

PROPOSED AMENDMENTS
Various Sections of the Springfield Development Code (SDC) are amended to remove barriers to Low-Impact Development and define stormwater terms. This appendix is added to the Springfield Development Code to describes the approved standard infiltration testing specifications. The proposed amendments are shown in legislative format (deleted text with strike-thru red font and new text with double underline red font). Commentary is shown in *purple italics font*, preceding the text to which it is referring.

APPENDIX C

INFILTRATION TESTING

COMMENTARY: This appendix provides the acceptable methods to determine how much infiltration is available on site and is an integral part of the method to determine if a site can meet the required onsite retention standard of 1.4" of runoff to stay on site. The city does not currently have a method listed in the EDSPM. This is sourced from the City of Eugene Stormwater Management Manual.

(A) Applicability

(1) To properly size and locate stormwater management facilities, it is necessary to characterize the soil infiltration conditions at the location of the proposed facility. All projects that propose onsite infiltration must evaluate existing site conditions and determine:

(a) If the infiltration rate is adequate to support the proposed stormwater management facility (satisfied through presence of mapped NRCS Type A & B Soils or the Simplified Approach infiltration test) or;

(b) The design infiltration rate prior to facility design (satisfied through the Presumptive Approach infiltration testing conducted by a qualified professional).

The following sections provide the approved standard infiltration testing specifications.

COMMENTARY: This method is for small scale developers and homeowners to ensure that onsite soils can infiltrate the minimum amount required for the simplified sizing method without the use of a design professional. The factor of safety is built into this minimum amount.

(B) Simplified Approach Open Pit Infiltration Test

(1) The purpose of the Simplified Approach is to provide a method which can be conducted by a nonprofessional for design of simple stormwater systems on small projects.

(2) The Simplified Approach open pit test is applicable only to projects on private property with less than 15,000 square feet of new or redeveloped impervious area.

(a) The results of infiltration testing must be documented on the Simplified Approach Form.

(b) The Simplified Approach cannot be used to find a design infiltration rate.

(c) The intent of the open pit test is to determine whether or not the local infiltration rate is adequate (2 inches/hour or greater) for the predesigned stormwater facilities described in Appendix F of the EDSPM (Infiltration swales, basins, planters, drywells, and trenches).

(d) The Simplified Approach Infiltration Test does not need to be conducted by a licensed professional.

(C) Simplified Approach Procedure

(1) A simple open pit infiltration test is required for each facility designed through the Simplified Approach. The test should be where the facility is proposed or within the immediate vicinity.

(a) Excavate a test hole to the depth of the bottom of the infiltration system, or otherwise to 4 feet.

(i) The test hole can be excavated with small excavation equipment or by hand using a shovel, auger, or post hole digger.

(ii) If a layer hard enough to prevent further excavation is encountered, or if noticeable moisture/water is encountered in the

soil, stop and measure this depth from the surface and record it on the Simplified Approach Form. Proceed with the test at this depth.

(iii) Fill the hole with water to a height of about 6 inches from the bottom of the hole and record the exact time. Check the water level at regular intervals (every 1 minute for fast draining soils to every 10 minutes for slower-draining soils) for a minimum of 1 hour or until all of the water has infiltrated. Record the distance the water has dropped from the top edge of the hole.

(iv) Repeat this process two more times, for a total of three rounds of testing.

(v) These tests should be performed as close together as possible to accurately portray the soil's ability to infiltrate at different levels of saturation. The third test provides the best measure of the saturated infiltration rate.

(b) For each test pit required, submit all three testing results with the date, duration, drop in water height, and conversion into inches per hour.

(c) If the results of the Simplified Approach open pit test show an infiltration rate greater than 2.0 inches per hour, the applicant can proceed with Simplified Approach facility design (where applicable).

(d) If the applicant would like to use an infiltration rate for design purposes, a Presumptive Infiltration Test must be conducted.

COMMENTARY: This method is for small to medium scale development that provides a more thorough test than the simplified method and is to be used for developments that are larger and more complex. A design professional is required for these tests to determine the actual infiltration rate.

(D) Presumptive Infiltration Testing

(1) The Presumptive Approach must be used for all public and private developments where the Simplified Approach is not applicable.

(2) The qualified professional must exercise judgment in the selection of the infiltration test method.

(3) The three infiltration available testing methods used to determine a design infiltration rate are:

(a) Open pit falling head;

(b) Encased falling head; or

(c) Double-ring infiltrometer.

(4) Where satisfactory data from adjacent areas is available that demonstrates infiltration testing is not necessary, the infiltration testing requirement may be waived.

(5) Waiver of the site specific testing is subject to approval by the City.

(6) Recommendation for foregoing infiltration testing must be submitted in a report which includes supporting data and is stamped and signed by the project engineer or geologist.

COMMENTARY: This section sets the parameters for ensuring the tests are relevant and done correctly to ensure the stormwater management system will function correctly and meet the requirements of the MS4 permit for onsite retention.

(E) Testing Criteria

(1) Except for the Simplified Approach, all testing must be conducted or overseen by a qualified professional who is either a Professional Engineer, Registered Geologist, Soil Scientist or other professional testing service with equivalent training and experience in determining the permeability of soils.

(2) The depth of the test must correspond to the facility depth.

(a) If a confining layer is observed during the subsurface investigation to be within 4 feet of the bottom of the planned infiltration system, the testing should be conducted within that confining layer.

(b) Tests must be performed in the immediate vicinity of the proposed facility.

(c) Exceptions can be made to the test location provided the qualified professional can support that the strata are consistent from the proposed facility to the test location.

(d) Infiltration testing should not be conducted in engineered or undocumented fill.

(F) Minimum Number of Required Tests

(1) The simplified Approach requires one infiltration test for every proposed facility.

(2) The Presumptive Approach requires one infiltration test for every proposed facility or one test for every 100 feet of proposed linear facility.

(3) Generalized soil infiltration rates may be used if facilities are proposed in areas of consistent topography and soil strata as outlined in a Geotechnical report.

COMMENTARY: This factor of safety is the common industry standard to account for all the unknowns in soil and rainfall amounts.

(G) Factor of Safety

(1) A minimum factor of safety of 2 shall be applied to field obtained infiltration rates where infiltration of the site performance standard storm per 4.3.110 (B) is proposed.

COMMENTARY: All of the presumptive method testing are common industry standard tests. The open pit method is used frequently and suitable for most soil conditions and building types encountered in Springfield.

(H) Presumptive Infiltration Testing Instructions

Open Pit Falling Head Procedure

The open pit falling head procedure is performed in an open excavation and therefore is a test of the combination of vertical and lateral infiltration.

(1) Excavate a hole with bottom dimensions of approximately 2 feet by 2 feet into the native soil to the elevation of the proposed facility bottom. Smooth excavations should be scratched and loose material removed.

(2) Fill the hole with clean water a minimum of 1 foot above the soil to be tested, and maintain this depth of water for at least 4 hours (or overnight if clay soils are present) to presoak the native material.

(a) In sandy soils with little or no clay or silt, soaking is not necessary.

(b) If after filling the hole twice with 12 inches of water, the water seeps completely away in less than 10 minutes, the test can proceed immediately.

(3) Determine how the water level will be accurately measured. The measurements should be made with reference to a fixed point.

(4) After the presaturation period, refill the hole with water to 12 inches above the soil and record the time.

(a) Alternative water head heights may be used for testing provided the presaturation height is adjusted accordingly.

(b) Measure the water level at 10-minute intervals for a total period of 1 hour (or 20-minute intervals for 2 hours in slower soils) or until all of the water has drained.

(c) In faster draining soils (sands and gravels), it may be necessary to shorten the measurement interval in order to obtain a well-defined infiltration rate curve.

(d) Constant head tests may be substituted for falling head tests at the discretion of the professional overseeing the infiltration testing.

(5) Repeat the test.

(a) Successive trials should be run until the percent change in measured infiltration rate between two successive trials is minimal.

(b) The trial should be discounted if the infiltration rate between successive trials increases.

(c) At least three trials must be conducted. After each trial, the water level is readjusted to the 12 inch level.

(6) The average infiltration rate over the last trial should be used to calculate the unfactored infiltration rate. The final rate must be reported in inches per hour.

(7) For very rapidly draining soils, it may not be possible to maintain a water head above the bottom of the test pit. A rate based test may be used if the infiltration rate meets or exceeds the flow of water into the test pit.

Note that a maximum infiltration rate of 20 inches per hour can be used in stormwater system design.

(l) Encased Falling Head Test

The encased falling head procedure is performed with a 6-inch casing that is embedded approximately 6 inches into the native soil. The goal of this field test is to evaluate the vertical infiltration rate through a 6-inch plug of soil, without allowing any lateral infiltration. The test is not appropriate in gravelly soils or in other soils where a good seal with the casing cannot be established.

(1) Embed a solid 6-inch diameter casing into the native soil at the elevation of the proposed facility bottom. Ensure that the embedment provides a good seal around the pipe casing so that percolation will be limited to the 6-inch plug of the material within the casing.

(a) This method can also be used when testing within hollow stem augers, provided the driller and tester are reasonably certain that a good seal has been achieved between the soil and auger.

(3) Fill the pipe with clean water a minimum of 1 foot above the soil to be tested, and maintain this depth for at least 4 hours (or overnight if clay soils are present) to presoak the native material.

(a) Any soil that sloughed into the hole during the soaking period should be removed.

(b) In sandy soils with little or no clay or silt, soaking is not necessary.

(c) If after filling the hole twice with 12 inches of water, the water seeps completely away in less than 10 minutes, the test can proceed immediately.

(4) To conduct the first trial of the test, fill the pipe to approximately 12 inches above the soil and measure the water level.

(a) Alternative water head heights may be used for testing provided the presaturation height is adjusted accordingly.

(b) The level should be measured with reference to a fixed point. Record the exact time.

(c) Measure the water level at 10-minute intervals for a total period of 1 hour (or 20-minute intervals for 2 hours in slower soils) or until all of the water has drained.

(d) In faster draining soils (sands and gravels), it may be necessary to shorten the measurement interval in order to obtain a well-defined infiltration rate curve.

(i) Constant head tests may be substituted for falling head tests at the discretion of the professional overseeing the infiltration testing.

(ii) Successive trials should be run until the percent change in measured infiltration rate between two successive trials is minimal.

(iii) The trial should be discounted if the infiltration rate between successive trials increases.

(iv) At least three trials must be conducted.

(v) After each trial, the water level is readjusted to the 12 inch level.

(vi) The average infiltration rate over the last trial should be used to calculate the unfactored infiltration rate.

(vii) Alternatively, the infiltration rate measured over the range of water head applicable to the project stormwater system design may be used at the discretion of the professional overseeing the testing.

(viii) The final rate must be reported in inches per hour.

(J) Double Ring Infiltrometer Test

(1) The double-ring infiltrometer test procedure should be performed in accordance with ASTM 3385-94.

(2) The test is performed within two concentric casings embedded and sealed to the native soils. The outer ring maintains a volume of water to diminish the potential of lateral infiltration through the center casing. The volume of water added to the center ring to maintain a static water level is used to calculate the infiltration rate.

(3) The double-ring infiltrometer is appropriate only in soils where an adequate seal can be established.

(K) Reporting Requirements

The following information should be included in the Infiltration Testing Report. The Infiltration Testing Report should be attached to the project's Stormwater Management Report:

(1) Statement of project understanding (proposed stormwater system).

(2) Summary of subsurface conditions encountered.

(3) Summary of infiltration testing including location and number of tests and testing method used.

(4) Discussion of how the tests were performed (i.e. pipe type or diameter or test pit dimensions).

(5) Infiltration testing results in inches per hour.

(6) Recommended design infiltration rate including factors of safety.

(7) Groundwater observations within exploration and an estimate of the depth to seasonal high groundwater.

(8) Site plan showing location of infiltration tests.

(9) Boring or test pit logs.

- **(a)** The logs should include an associated soil classification consistent with ASTM D2488-00, Standard Practice for Classification for Description and Identification of Soils (Visual-Manual Procedure).

- **(b)** The logs should also include any additional pertinent subsurface information, such as soil moisture conditions, depth and description of undocumented or engineered fill, soil color and mottling conditions, soil stiffness or density, and approximate depth of contact between soil types.

(10) Infiltration Test Data

Explanation of Appendices to the Springfield Development Code Appendix D Typical Stormwater Facility Details to Incorporate MS4 Permit Requirements

PROPOSED AMENDMENTS

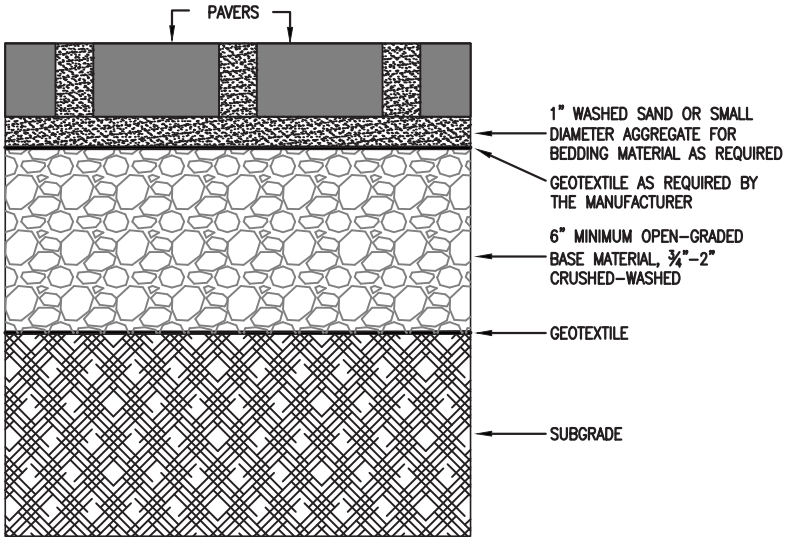
Various Sections of the Springfield Development Code (SDC) are amended to remove barriers to Low-Impact Development and define stormwater terms. This appendix is added to the Springfield Development Code to describe the most commonly used stormwater treatment facilities. The proposed amendments are shown in legislative format (deleted text with strike-thru red font and new text with double underline red font). Changes shown since the Public Review Draft on June 13, 2023 are highlighted in yellow. Commentary is shown in *purple italics font*, preceding the text to which it is referring.

APPENDIX D
TYPICAL STORMWATER FACILITY DETAILS

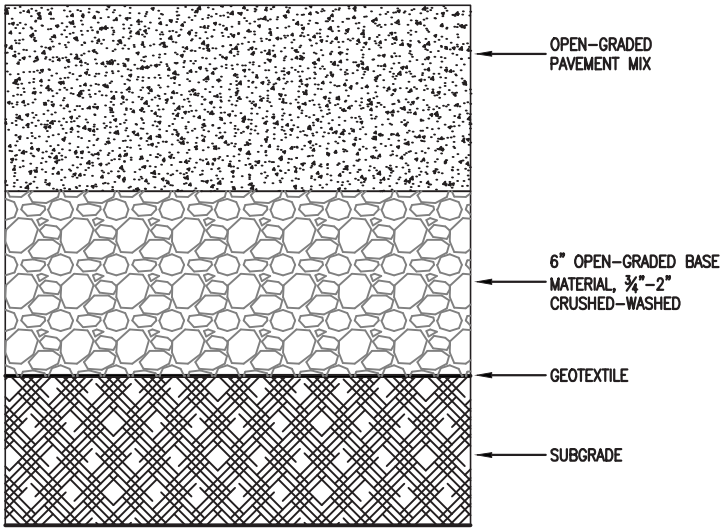
COMMENTARY: This appendix provides a standard catalog of approved cross section details for the most commonly used stormwater treatment facilities. These details are sourced from the City of Eugene Stormwater Management Manual and are currently used for most developments in the Eugene-Springfield metro area.

Note: Some notes in the Typical Stormwater Facility Details were changed following comment from Springfield Utility Board to protect growing areas near wellheads (See notes for Vegetated Swale: 8., Grassy Swale: 6., Foundation Filtration Planter: 8., Filtration Planter 8., Infiltration Planter: 6., Filtration Rain Garden: 8., and Infiltration Rain Garden: 6.)

APPENDIX D
TYPICAL FACILITY DETAILS



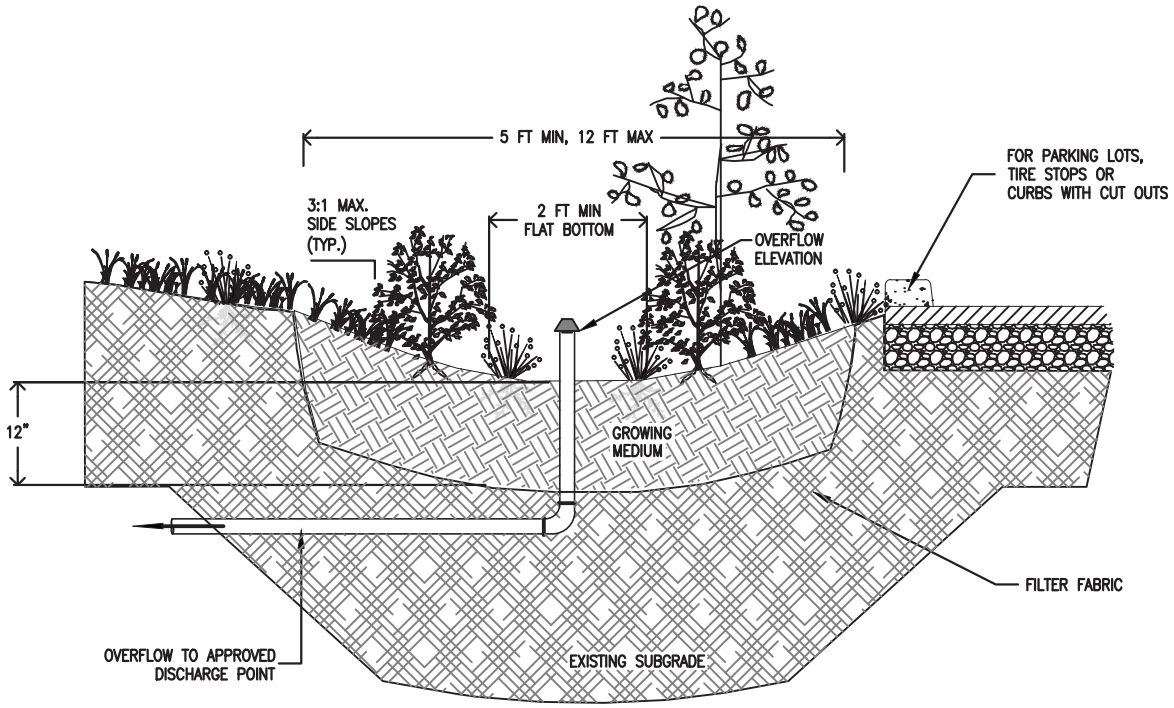
PERMEABLE CONCRETE BLOCK
OR "PAVER" SYSTEMS



PERVIOUS (OPEN GRADED) CONCRETE
AND ASPHALT

PERMEABLE PAVEMENTS

TYPICAL DETAILS



1. Provide protection from all vehicle traffic, equipment staging, and foot traffic in proposed infiltration areas prior to, during, and after construction.

2. Dimensions:
   a. Width of swale: 5' - 12'.
      Depth of swale: 12"
   b. Longitudinal slope of swale: 0.5% min and 6% max.
   c. Flat bottom width: 2' minimum.
   d. Side slopes of swale: 3:1 maximum.

3. Setbacks (from centerline of facility):
   a. Infiltration swales must be 10' from foundations and 5' from property lines.
   b. Filtration swales must have a waterproof liner when within 10' from foundation of 5' from property lines.

4. Overflow:
   a. Overflows are required to an approved point discharge point unless sized to fully infiltrate the flood control design storm.
   b. Inlet elevation must allow for 2" of freeboard, minimum.

5. Piping: Minimum 3" pipe required for up to 1,500 sq ft of impervious area, otherwise 4" min. Piping material, slopes and installation shall follow the Uniform Plumbing Code.

6. Drain rock:
   a. Size: 3/4" - 2-1/2" washed
   b. Depth: 12" minimum

7. A geotextile is required to isolate the drain rock from the subgrade and growing medium.

8. Growing medium:
   a. In 0-2 year TOTZ, a 24" minimum with at least 50% organic material
   b. In all other areas, 12" minimum
   c. Import topsoil or amended native soil

9. Vegetation: Follow landscape plans otherwise refer to plant list in SWMM Appendix F. Vegetative swales must have following plantings per 100sf of facility area:
   a. 100 Ground Covers, OR
   b. 80 Ground Covers, 2 Small Shrubs, 4 Large Shrubs, and 1 Tree (deciduous or evergreen)

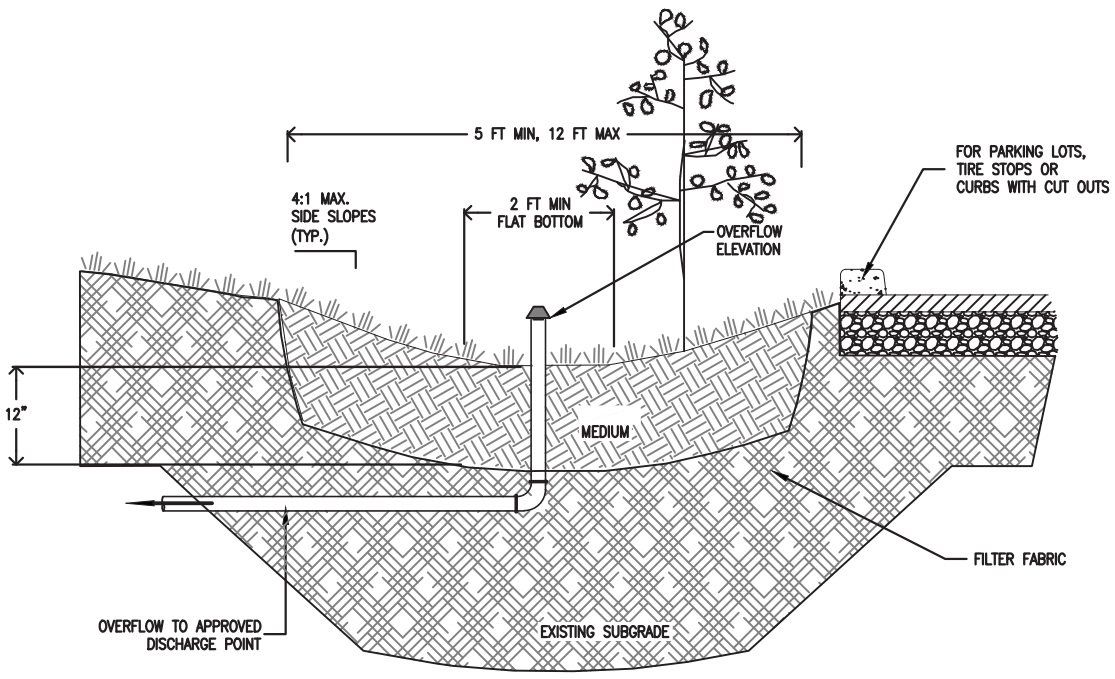
10. Waterproof liner: Shall be 30 mil PVC or equivalent for flow-through facilities.

11. Install washed pea gravel or river rock to transition from inlets and splash pad to growing medium.

12. Check dams: Shall be placed at 12" intervals along the length of the swale.

VEGETATED SWALE

TYPICAL DETAILS



1. Provide protection from all vehicle traffic, equipment staging, and foot traffic in proposed infiltration areas prior to, during, and after construction.

2. Dimensions:
   a. Width of swale: 5' - 12'.
      Depth of swale: 12"
   b. Longitudinal slope of swale: 0.5% min and 6% max.
   c. Bottom width: 2' minimum.
   d. Side slopes: 3:1 maximum for vegetative and 4:1 for grassy.

3. Setbacks (from centerline of facility):
   a. Infiltration swales must be 10' from foundations and 5' from property lines.
   b. Filtration swales must have a waterproof liner when within 10' from foundation of 5' from property lines.

4. Overflow:
   a. Overflows are required to an approved point discharge point unless sized to fully infiltrate the flood control design storm.
   b. Inlet elevation must allow for 2" of freeboard, minimum.

5. Piping: Minimum 3" pipe required for up to 1,500 sq ft of impervious area, otherwise 4" min. Piping material, slopes and installation shall follow the Uniform Plumbing Code.

6. Growing medium:
   a. In 0-2 year TOTZ, a 24" minimum with at least 50% organic material
   b. In all other areas, 12" minimum
   c. Import topsoil or amended native soil

7. Vegetation: Follow landscape plans otherwise refer to plant list in SWMM Appendix F. Grassy swales must have 100 coverage. Vegetative swales must have following plantings per 100sf of facility area:
   a. 100 Ground Covers, OR
   b. 80 Ground Covers, 2 Small Shrubs, 4 Large Shrubs, and 1 Tree (deciduous or evergreen)

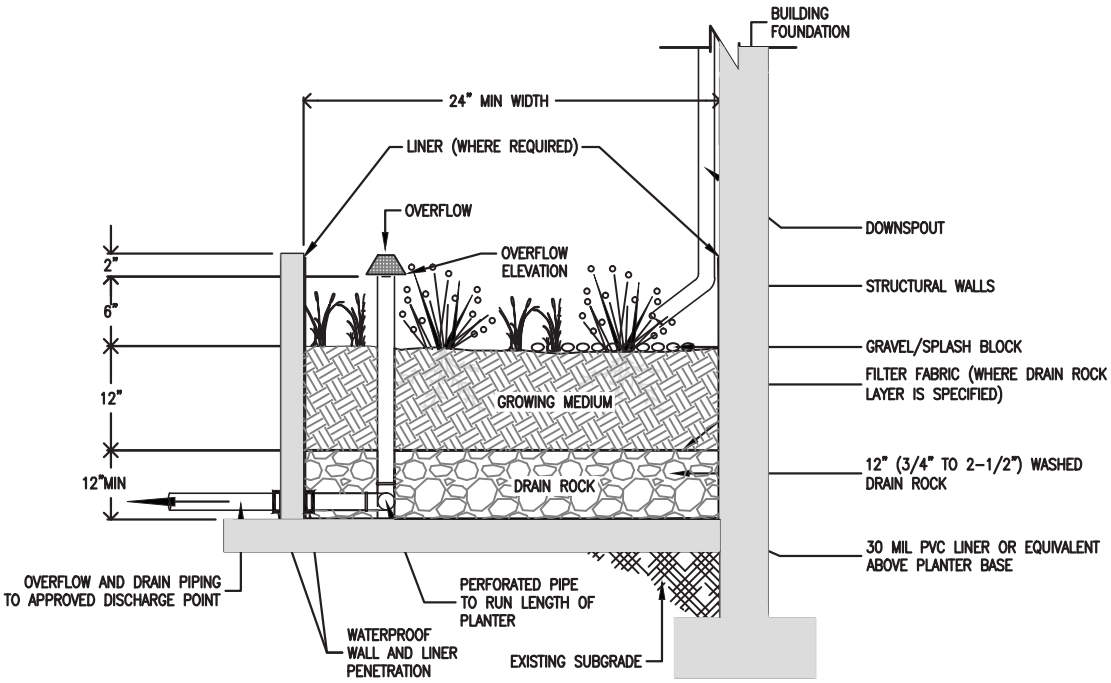
8. Waterproof liner: Shall be 30 mil PVC or equivalent where required.

9. Install washed pea gravel or river rock to transition from inlets and splash pad to growing medium.

10. Check dams: Shall be placed at 12" intervals along the length of the swale.

GRASSY SWALE

TYPICAL DETAILS



1. Provide protection from all vehicle traffic, equipment staging, and foot traffic in proposed infiltration areas prior to, during, and after construction.

2. Dimensions:
   a. Width of planter: 24” minimum.
   b. Depth of planter: 6" minimum from top of growing medium to overflow elevation.
   c. Slope of planter: 0.5% or less.

3. Setbacks:
   a. Infiltration planters must be 10' from foundations and 5' from property lines.
   b. Filtration planters do not require a setback with an approved waterproof liner.

4. Overflow:
   a. Overflows are required to an approved discharge point when using the Simplified Method
   b. Overflows are not required when sized to fully infiltrate the flood control event using the Presumptive Method.
   c. Minimum 2" freeboard from overflow elevation to the top of the planter walls.

5. Piping: Minimum 3” pipe required for up to 1,500 sq ft of impervious area, otherwise 4” min. Piping material, slopes and installation shall follow the Uniform Plumbing Code.

6. Drain rock:
   a. Size: 3/4” to 2-1/2" diameter open graded
   b. Depth: 12” Minimum
   c. Length and Width: Full length and width of facility

7. Drain rock layer shall be separated from the growing medium by a geotextile

8. Growing medium:
   a. In 0-2 year TOTZ, a 24" minimum with at least 50% organic material
   b. In all other areas, 12" minimum
   c. Import topsoil or amended native soil

9. Vegetation: Follow landscape plans otherwise refer to plant list in SWMM Appendix F. Number of plantings per 100sf of facility area:
   a. 100 Ground Covers, OR
   b. 80 Ground Covers and 4 Small Shrubs, OR
   c. 60 Ground Covers and 12 Small Shrubs

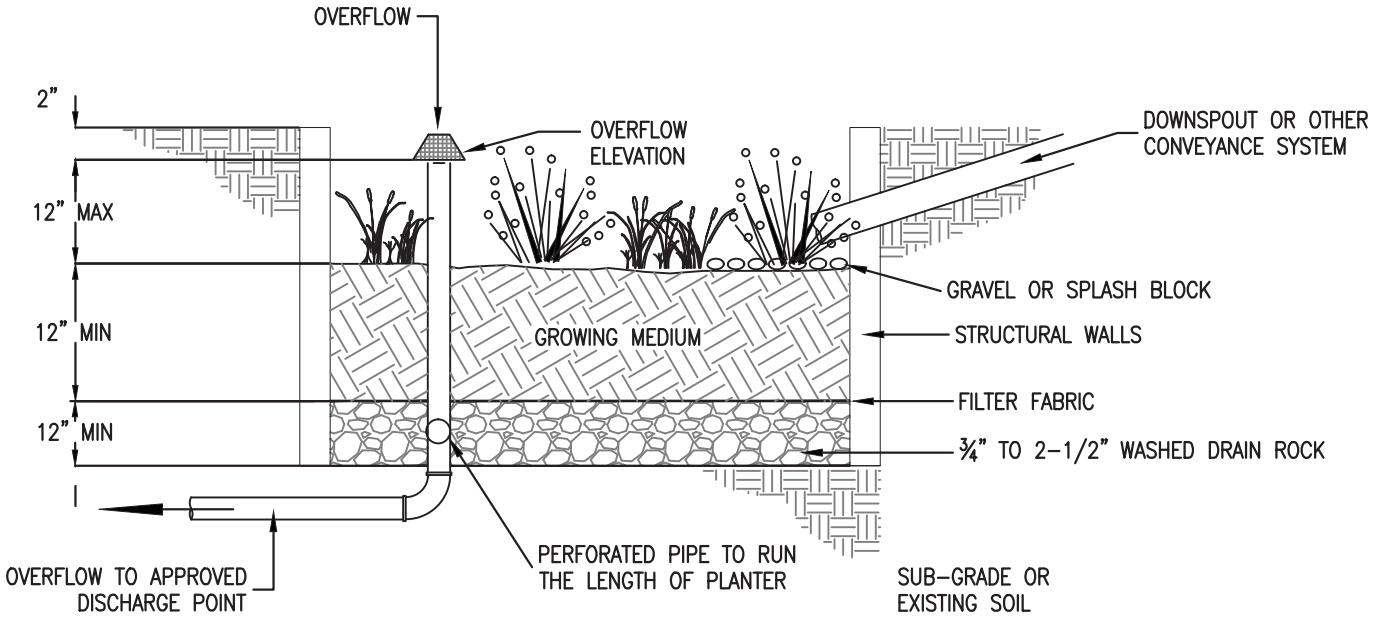
10. Planter walls:
   a. Material shall be stone, brick, concrete, wood, or other durable material (no chemically treated wood).
   b. Walls shall be included on building plans here incorporated into foundations or other permitted structures..

11. Waterproof liner (where required): Shall be 30 mil PVC or equivalent.

12. Install washed pea gravel or river rock to transition from inlet or splash pad to growing medium.

FOUNDATION
FILTRATION PLANTER

TYPICAL DETAILS



1. Provide protection from all vehicle traffic, equipment staging, and foot traffic in proposed infiltration areas prior to, during, and after construction.

2. Dimensions:
   a. Width of planter: 24" minimum.
   b. Depth of planter: 6" minimum from top of growing medium to overflow elevation.
   c. Slope of planter: 0.5% or less.

3. Setbacks:
   a. Infiltration planters must be 10' from foundations and 5' from property lines.
   b. Filtration planters do not require a setback with an approved waterproof liner.

4. Overflow:
   a. Overflows are required to an approved discharge point when using the Simplified Method
   b. Overflows are not required when sized to fully infiltrate the flood control event using the Presumptive Method.
   c. Minimum 2" freeboard from overflow elevation to the top of the planter walls.

5. Piping: Minimum 3" pipe required for up to 1,500 sq ft of impervious area, otherwise 4" min. Piping material, slopes and installation shall follow the Uniform Plumbing Code.

6. Drain rock:
   a. Size: 3/4" to 2-1/2" diameter open graded
   b. Depth: 12" Minimum
   c. Length and Width: Full length and width of facility

7. Drain rock layer shall be separated from the growing medium by a geotextile filter fabric

8. Growing medium:
   a. In 0-2 year TOTZ, a 24" minimum with at least 50% organic material
   b. In all other areas, 12" minimum
   c. Import topsoil or amended native soil.

9. Vegetation: Follow landscape plans otherwise refer to plant list in SWMM Appendix F. Minimum container size is 1 gallon. # of plantings per 100sf of facility area:
   a. 100 Ground Covers, OR
   b. 80 Ground Covers and 4 Small Shrubs, OR
   c. 60 Ground Covers and 12 Small Shrubs

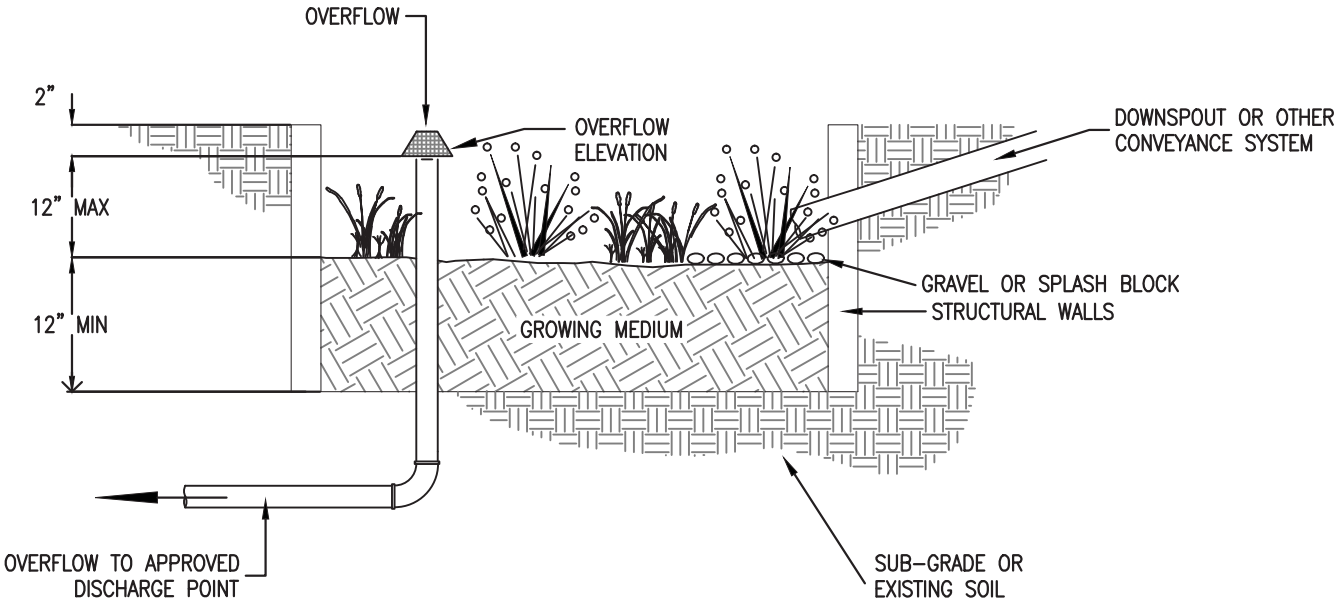
10. Planter walls:
   a. Material shall be stone, brick, concrete, wood, or other durable material (no chemically treated wood).
   b. Walls shall be included on building plans here incorporated into foundations or other permitted structures..

11. Waterproof liner (where required): Shall be 30 mil PVC or equivalent.

12. Install washed pea gravel or river rock to transition from inlet or splash pad to growing medium.

FILTRATION PLANTER

TYPICAL DETAILS



1. Provide protection from all vehicle traffic, equipment staging, and foot traffic in proposed infiltration areas prior to, during, and after construction.

2. Dimensions:
   a. Width of planter: 24" minimum.
   b. Depth of planter: 6" minimum from top of growing medium to overflow elevation.
   c. Slope of planter: 0.5% or less.

3. Setbacks:
   a. Infiltration planters must be 10' from foundations and 5' from property lines.
   b. Filtration planters do not require a setback with an approved waterproof liner.

4. Overflow:
   a. Overflows are required to an approved discharge point when using the Simplified Method
   b. Overflows are not required when sized to fully infiltrate the flood control event using the Presumptive Method.
   c. Minimum 2" freeboard from overflow elevation to the top of the planter walls.

5. Piping: Minimum 3" pipe required for up to 1,500 sq ft of impervious area, otherwise 4" min. Piping material, slopes and installation shall follow the Uniform Plumbing Code.

6. Growing medium:
   a. In 0-2 year TOTZ, a 24" minimum with at least 50% organic material
   b. In all other areas, 12" minimum
   c. Import topsoil or amended native soil

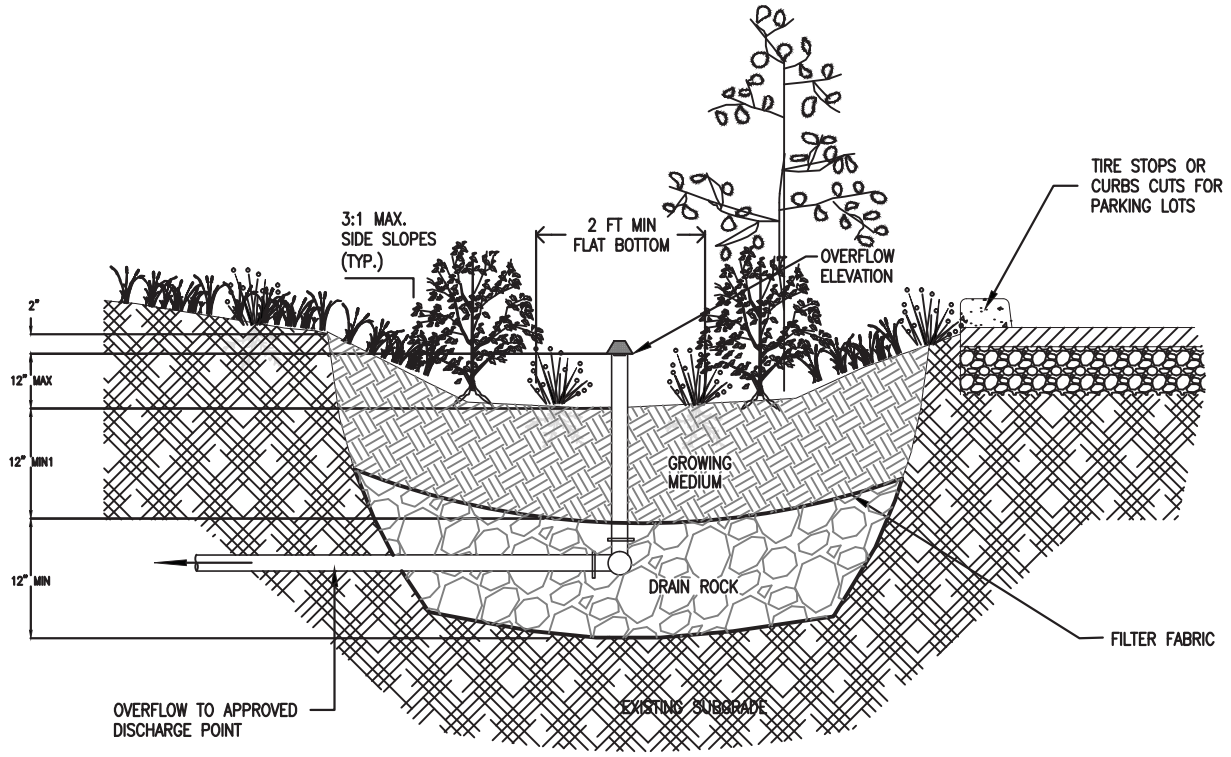
7. Vegetation: Follow landscape plans otherwise refer to plant list in SWMM Appendix F. Minimum container size is 1 gallon. # of plantings per 100sf of facility area:
   a. 100 Ground Covers, OR
   b. 80 Ground Covers and 4 Small Shrubs, OR
   c. 60 Ground Covers and 12 Small Shrubs

8. Planter walls:
   a. Material shall be stone, brick, concrete, wood, or other durable material (no chemically treated wood).
   b. Walls shall be included on building plans here incorporated into foundations or other permitted structures..

9. Install washed pea gravel or river rock to transition from inlet or splash pad to growing medium.

INFILTRATION PLANTER

TYPICAL DETAILS



1. Provide protection from all vehicle traffic, equipment staging, and foot traffic in proposed infiltration areas prior to, during, and after construction.

2. Dimensions:
   a. Depth of rain garden: 6" minimum and 12" maximum
   b. Flat bottom width: 2' min.
   c. Side slopes of Rain Garden: 3:1 maximum.

3. Setbacks:
   a. Infiltration rain gardens must be 10' from foundations and 5' from property lines. Filtration Rain Garden do not require a setback with an approved waterproof liner.

4. Overflow:
   a. Overflows are required unless sized to fully infiltrate the flood control design storm.
   b. Inlet elevation must allow for 2" of freeboard, minimum.

5. Piping: Minimum 3" pipe required for up to 1,500 sq ft of impervious area, otherwise 4" min. Piping material, slopes and installation shall follow the Uniform Plumbing Code.

6. Drain rock:
   a. Size: 3/4"-2-1/2" washed
   b. Depth: 12" Minimum

7. Drain rock later shall be separated form the growing medium and the surround soils by a geotextile filter fabric.

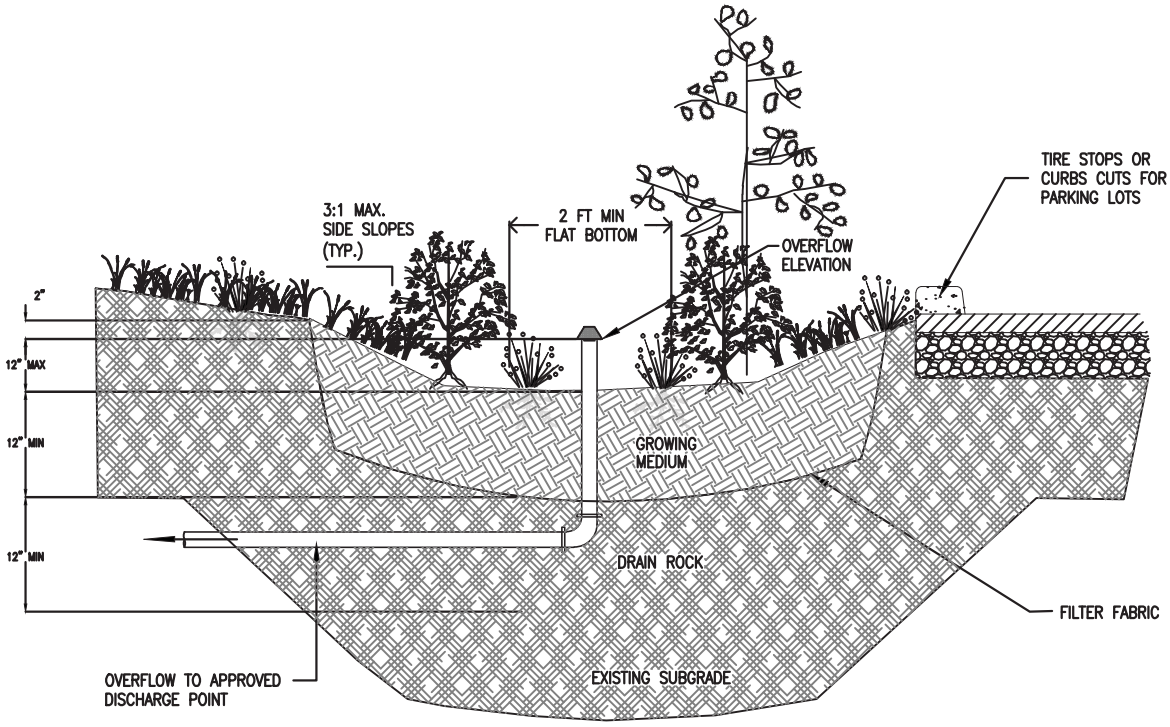
8. Growing medium:
   a. In 0-2 year TOTZ, a 24" minimum with at least 50% organic material
   b. In all other areas, 12" minimum
   c. Import topsoil or amended native soil

9. Vegetation: Follow landscape plans otherwise refer to plant list in SWMM Appendix F. Number of plantings per 100sf of facility area:
   a. 100 Ground Covers, OR
   b. 80 Ground Covers, 2 Large Shrubs 4 Small Shrubs and 1 tress (deciduous or evergreen)

10. Install washed pea gravel or river rock to transition from inlets and splash pad to growing medium.

FILTRATION RAIN GARDEN

TYPICAL DETAILS



1. Provide protection from all vehicle traffic, equipment staging, and foot traffic in proposed infiltration areas prior to, during, and after construction.

2. Dimensions:
   a. Depth of rain garden: 6" minimum and 12" maximum
   b. Flat bottom width: 2' min.
   c. Side slopes of Rain Garden: 3:1 maximum.

3. Setbacks:
   a. Infiltration rain gardens must be 10' from foundations and 5' from property lines. Filtration Rain Garden do not require a setback with an approved waterproof liner.

4. Overflow:
   a. Overflows are required unless sized to fully infiltrate the flood control design storm.
   b. Inlet elevation must allow for 2" of freeboard, minimum.

5. Piping: Minimum 3" pipe required for up to 1,500 sq ft of impervious area, otherwise 4" min. Piping material, slopes and installation shall follow the Uniform Plumbing Code.

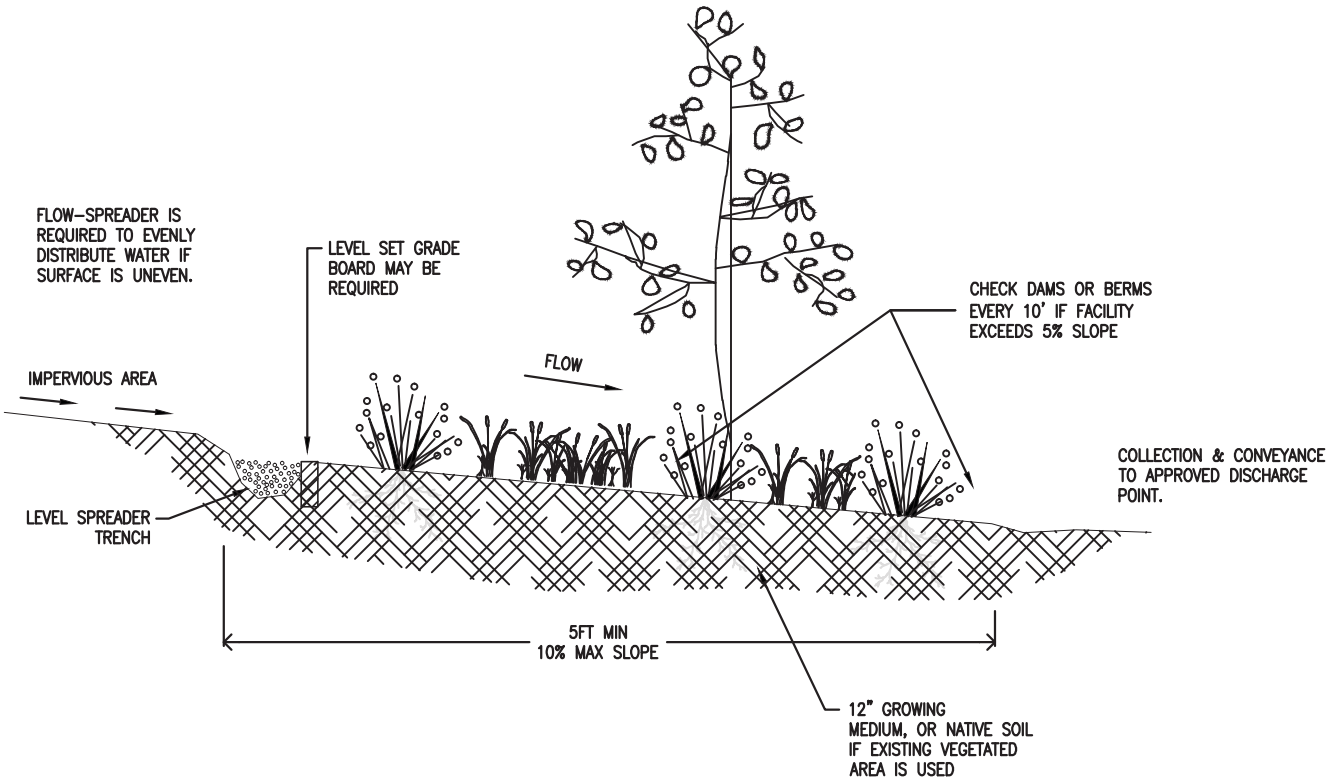
6. Growing medium:
   a. In 0-2 year TOTZ, a 24" minimum with at least 50% organic material
   b. In all other areas, 12" minimum
   c. Import topsoil or amended native soil

7. Vegetation: Follow landscape plans otherwise refer to plant list in SWMM Appendix F. Number of plantings per 100sf of facility area:
   a. 100 Ground Covers, OR
   b. 80 Ground Covers, 2 Large Shrubs 4 Small Shrubs and 1 tress (deciduous or evergreen)

8. Install washed pea gravel or river rock to transition from inlets and splash pad to growing medium.

INFILTRATION RAIN GARDEN

TYPICAL DETAILS



1. Provide protection from all vehicle traffic, equipment staging, as well as foot traffic for proposed infiltration areas prior to and during construction.

2. Dimensions:
    a. Flow line length: 5' minimum.
    b. Slopes: 0.5 - 10%

3. Setbacks (from beginning of facility):
    a. 5' from property line
    b. 10ft from buildings
    c. 50ft from wetlands, rivers, streams, and creeks where required.

4. Overflow: Collection from filter strip shall be specified on plans to approved discharge point.

5. Growing medium: Unless existing vegetated areas are used for the filter strip, growing medium shall be used within the top 12".

6. Vegetation: The entire filter strip must have 100% coverage by native grasses, native wildflower blends, native ground covers, or any combination thereof. Follow landscape plans otherwise refer to plant list in SWMM Appendix F. Number of plantings per 100sf of facility area:
    a. 100 Ground Covers, OR
    b. 80 Ground Covers, 4 Small Shrubs, OR
    c. 60 Ground Covers, 12 Small Shrubs

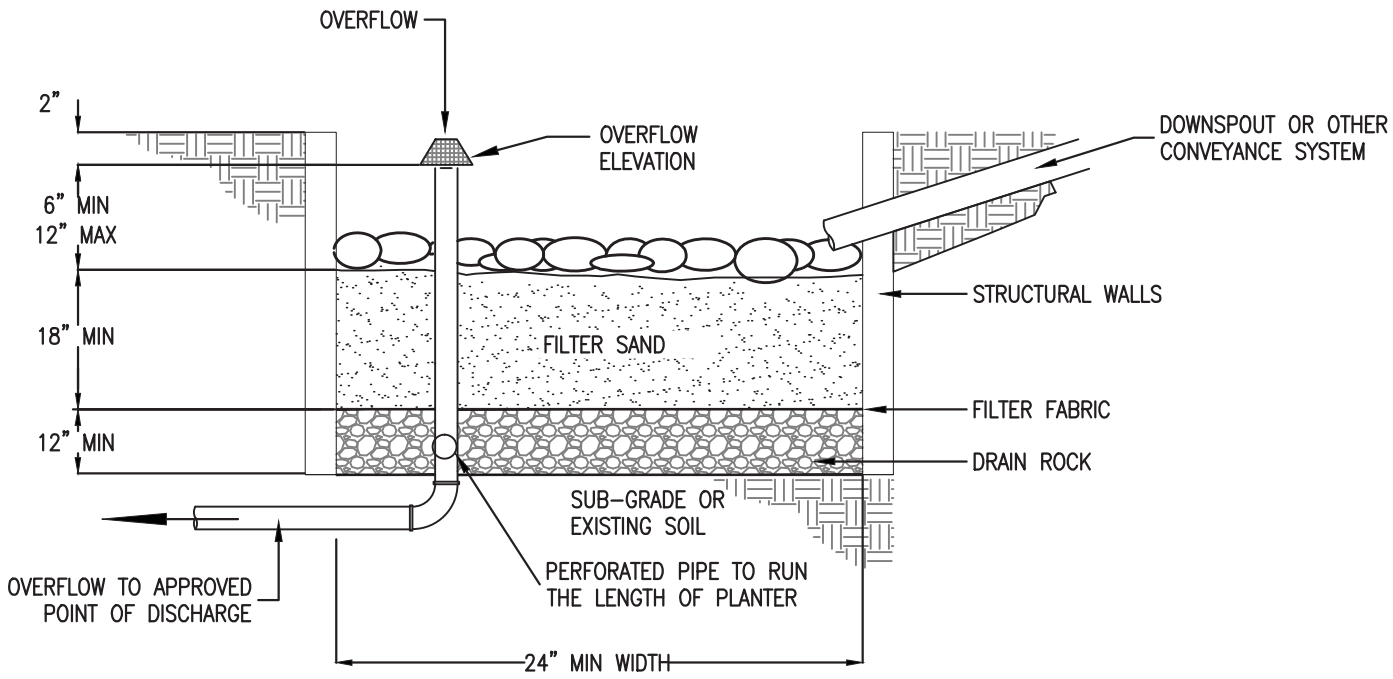
7. Level Spreaders: A grade board, perforated pipe, berm or trench may be required to disperse the runoff evenly across the filter strip to prevent a point of discharge. The top of the level spreader must be horizontal and at an appropriate height to provide sheet flow directly to the soil without scour. Grade boards can be made of any material that will withstand weather and solar degradation. Trenches used as level spreaders can be open or filled with washed crushed rock, pea gravel, or sand

8. Check dams: shall be placed according to facility design otherwise:

    a. Equal to the width of the filter
    b. Every 10' where slope exceeds 5%.

FILTER STRIP

TYPICAL DETAILS



1. Provide protection from all vehicle traffic, equipment staging, and foot traffic in proposed infiltration areas prior to, during, and after construction.

2. Dimensions:
   a. Width: 24" minimum.
   b. Depth: 6" minimum
   c. Slope: 0.5% or less

3. Setbacks (from centerline of f):
   a. Infiltration sand filters must be 10' from foundations and 5' from property lines. Filtration sand filters do not have setbacks with an approved waterproof liner.

4. Overflow:
   a. Overflows are required to an approved point of discharge.
   b. Inlet elevation must allow for 2" of freeboard, minimum.

5. Piping: Minimum 3" pipe required for up to 1,500 sq ft of impervious area, otherwise 4" min. Piping material, slopes and installation shall follow the Uniform Plumbing Code.

6. Drain rock (minimum): 12" minimum of 3/4" - 2-1/2" washed.
   .

7. Separation between drain rock: Drain rock shall be separated from sand layer and surrounding sold by a geotextile filter fabric

8. Filter sand:
   a. 18" minimum.
   b. See sand specification in SWMM.

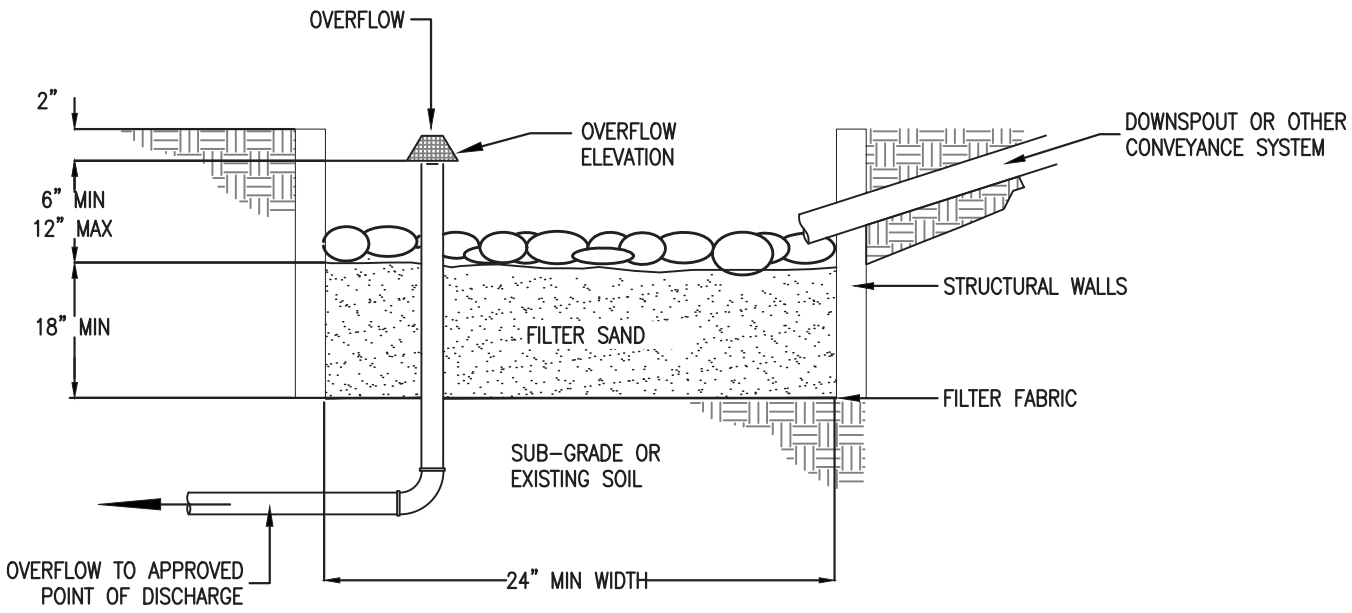
9. Sand filter walls:
   a. Material shall be stone, brick, concrete, wood, or other durable material (no chemically treated wood).
   b. Filter walls built into foundation walls shall be shown on building plans.

10. Waterproof liner (where required): Shall be 30 mil PVC or equivalent.

11. Install washed pea gravel or river rock to transition from inlet or splash pad to growing medium.

FILTRATION SAND FILTER

TYPICAL DETAILS



1. Provide protection from all vehicle traffic, equipment staging, and foot traffic in proposed infiltration areas prior to, during, and after construction.

2. Dimensions:
   a. Width: 24" minimum
   b. Depth: 6" minimum
   c. Slope: 0.5% or less.

3. Setbacks:
   a. Infiltration sand filters must be 10' from foundations and 5' from property lines.
   b. Flow-through sand filters must be less than 30" in height above surrounding area if within 5 feet of property line.

4. Overflow (where required):
   a. Overflow required for Simplified Approach.
   b. Inlet elevation must allow for 2" of freeboard, minimum.
   c. Protect from debris, sand, and sediment with strainer or grate.

5. Piping: Minimum 3" pipe required for up to 1,500 sq ft of impervious area, otherwise 4" min. Piping material, slopes and installation shall follow the Uniform Plumbing Code.

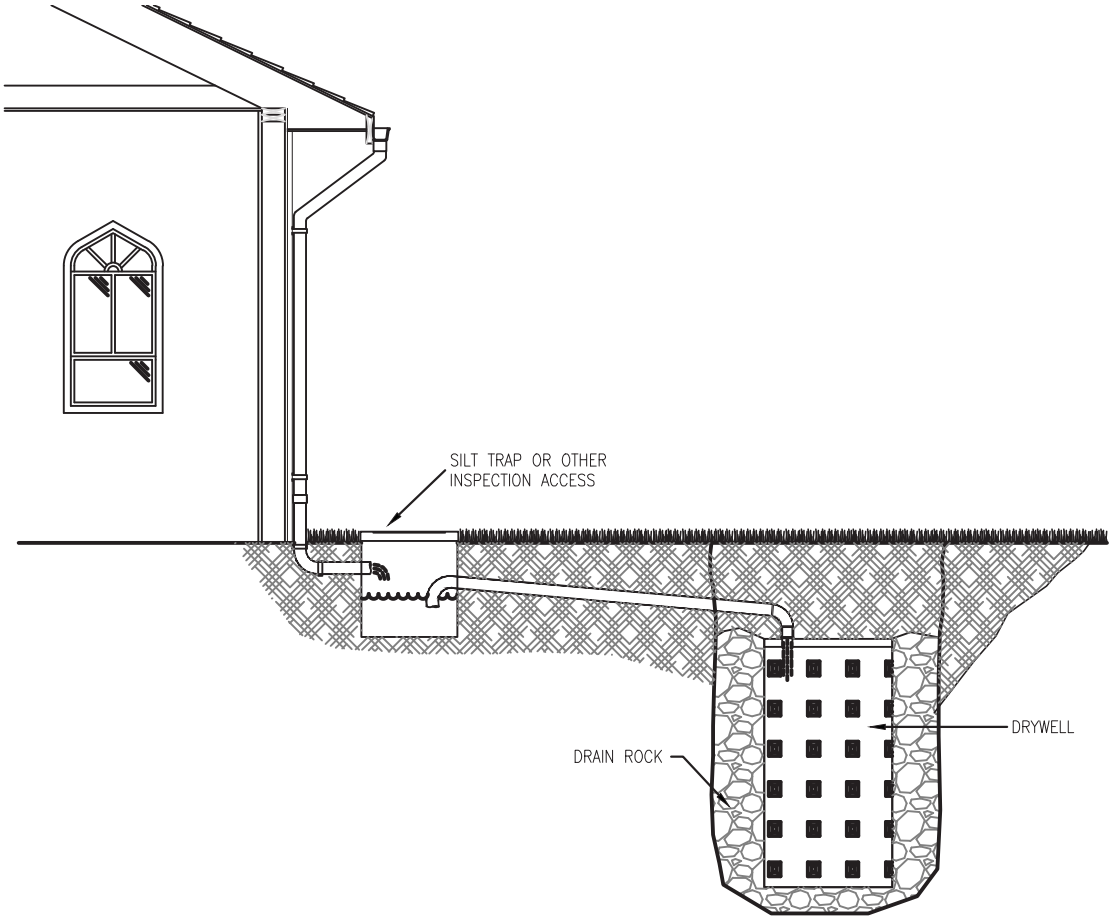
6. Filter sand:
   a. 18" minimum.
   b. See sand spec in SWMM Exhibit 2-4.

7. Sand filter walls:
   a. Material shall be stone, brick, concrete, wood, or other durable material (no chemically treated wood).
   b. Concrete, brick, or stone walls shall be included on foundation plans.

8. Install washed pea gravel or river rock to transition from inlet or splash pad to growing medium.

INFILTRATION SAND FILTER

TYPICAL DETAILS



1. All drywells are considered Class 5 injection wells and must be registered with the Oregon Department of Environmental Quality as Underground Injection Control (UIC) systems.

2. Provide protection from all vehicle traffic, equipment staging, and foot traffic in proposed infiltration areas prior to, during, and after construction.

3. Drywells shall be designed using the presumptive approach due to the limited soil conditions in Eugene and the need to fully infiltrate the flood control design storm. This detail is intended to illustrate a typical drywell installation. Installation shall conform to the drywell design provided by the Presumptive Method.

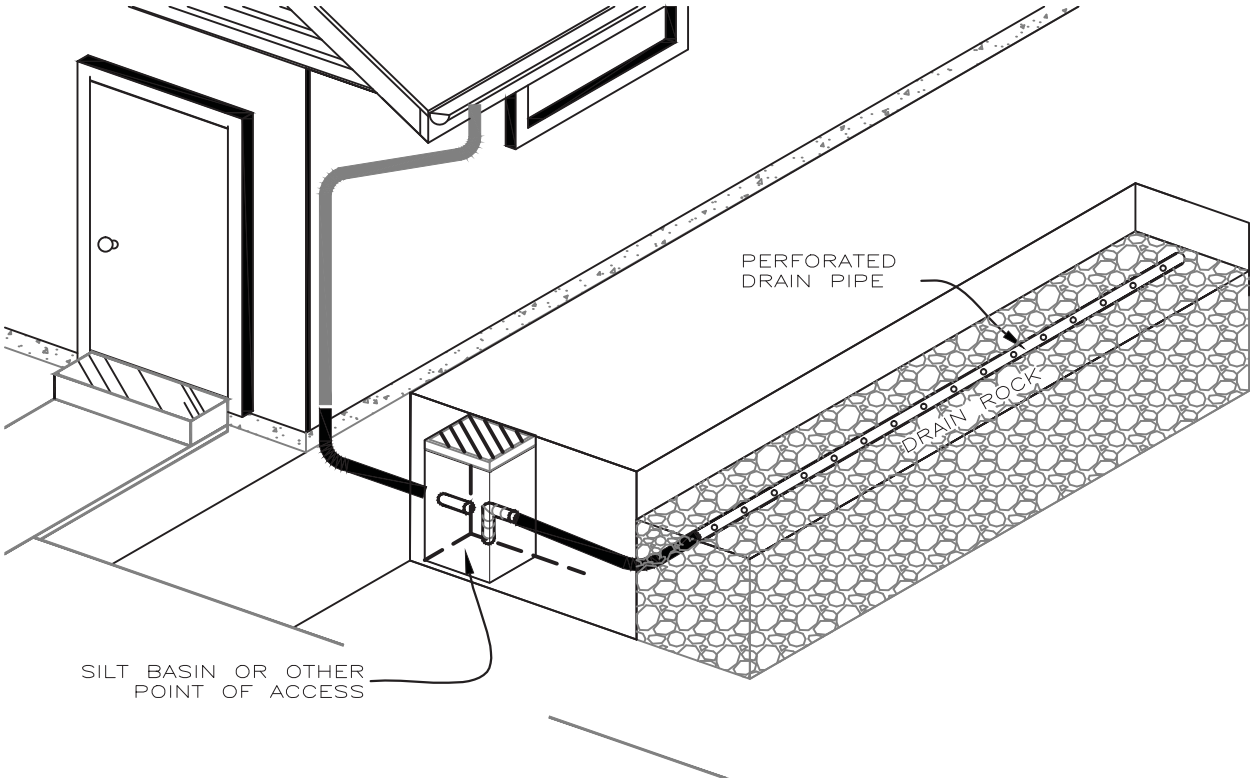
4. Setbacks (from center of facility):
   a. 10' from foundations
   b. 5' from property lines

5. Piping: Minimum 3" pipe required for up to 1,500 sq ft of impervious area, otherwise 4" min. Piping material, slopes and installation shall follow the Uniform Plumbing Code.

6. Silt Traps: A silt trap or other access point is required at finished grade for inspection and maintenance access

DRYWELL

TYPICAL DETAILS



1. All soakage trenches are considered injection wells and must be registered with the Oregon Department of Environmental Quality as Underground Injection Control (UIC) systems.

2. Provide protection from all vehicle traffic, equipment staging, and foot traffic in proposed infiltration areas prior to, during, and after construction.

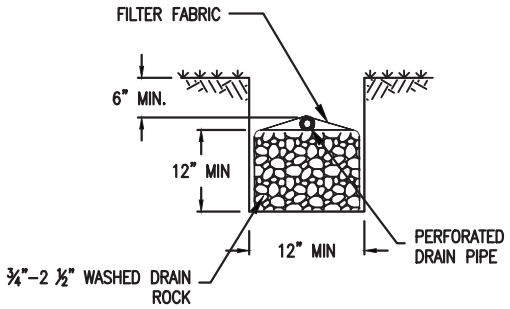
3. Soakage trenches shall be designed using the presumptive approach due to the limited soil conditions in Eugene and the need to fully infiltrate the flood control design storm. This detail is intended to illustrate a typical soakage trench installation. Installation shall conform to the soakage trench design provided by the Presumptive Method.

4. Setbacks (from center of facility):
   a. 10' from foundations
   b. 5' from property lines

5. Piping: Minimum 3" pipe required for up to 1,500 sq ft of impervious area, otherwise 4" min. Piping material, slopes and installation shall follow the Uniform Plumbing Code.

6. Silt Traps: A silt trap or other access point is required at finished grade for inspection and maintenance access

SOAKAGE TRENCH
TYPICAL CROSS SECTION



SOAKAGE TRENCH

TYPICAL DETAILS

Explanation of Appendices to the Springfield Development Code Appendix E Operations and Maintenance to Incorporate MS4 Permit Requirements

PROPOSED AMENDMENTS

Various sections of the Springfield Development Code (SDC) are being amended to remove barriers to Low-Impact Development and define stormwater terms. This appendix is being moved from the Engineering Design Standards and Procedures Manual (EDSPM) to the SDC. The proposed amendments are shown in legislative format (deleted text with strike-through red font and new text with double underline red font). Commentary is shown in *purple italics font*, preceding the text to which it is referring.

COMMENTARY: References to specific sections of the EDSPM were removed. References to the applicable proposed SDC sections were added.

APPENDIX E
~~INFORMATION PACKET~~
~~For~~
~~STORMWATER QUALITY FACILITY~~
OPERATIONS AND MAINTENANCE ~~PLAN~~

This ~~packet~~ appendix presents the operation and maintenance (O&M) requirements for stormwater management facilities designed and installed in the City of Springfield pursuant to SDC 4.3.110.

~~HOW TO USE THIS PACKET~~

~~After using Chapters 3 and 4 of the Springfield *Engineering Design Standards and Procedural Manual* to complete a stormwater management design for the project, fill out the Notice of Operations and Maintenance Agreement (NOMA) and the Operations and Maintenance Agreement (O&M Agreement). *For templates of these documents see Appendix 3A-1 and 3A-2.*~~

~~Attach a copy of the stormwater management plan showing the location of the stormwater management facilities on the site, sources of stormwater runoff, and ultimate stormwater destination to the agreements.~~

~~**Note:** Enforcement rules regarding the inspection, operations, and maintenance of stormwater management facilities can be found in Chapter 3 of the Springfield *Engineering Design Standards and Procedures Manual*.~~

INTRODUCTION

Notice of Operations and Maintenance Agreement - (NOMA)

~~This packet contains a template for the NOMA *(See Appendix 3A-1)*. The template may be used as is or modified, subject to City Engineer approval, to meet the needs of a specific site.~~ The NOMA must be in a form approved by the City Attorney and must identify ~~identifies~~ the property as having a stormwater management facility ~~on the property~~ and ~~identifies~~ the responsible party for future operations and maintenance. *The NOMA must be completed and recorded at Lane County Deeds and Records. Signatures on the NOMA shall be notarized.*

The intent of the NOMA is to ensure that the facility will be identified to future property owners and that the facility will be maintained according to ~~City Codes~~the Springfield Development Code, Springfield Municipal Code, ~~an~~ the O&M Agreement, and the O&M Plan for the site.

Operations and Maintenance Agreement – (O&M Agreement)

~~This packet contains a template of an O&M Agreement *(See Appendix 3A-2)*. The template may be used as is or modified, subject to City Engineer approval, to meet the needs of a specific site.~~ The O&M Agreement must be on a form approved by the City Attorney and must identif~~ieys~~ the property as having a stormwater management facility ~~on the property~~; ~~and identifies~~ the owner's name, address, email, and phone number~~;~~, the site address~~;~~, financially responsible party for ongoing operation and maintenance~~;~~; and parties responsible for inspecting and maintaining the

facility.

The O&M Agreement does not need to be recorded. The intent of the Agreement is to ensure that the facility will be maintained for functionality, aesthetics, and will identify accountability. The stormwater site plan attached to the Agreement will help identify to the owners and inspectors the location and the functions of the stormwater facilities, and the Facility Specific O&M Plan will identify the routine maintenance procedures and scheduling.

Facility Specific Operations and Maintenance Plan - (O&M Plan)

This ~~packet~~ appendix provides pre-approved Facility Specific Operations and Maintenance Plans (O&M Plans) for ~~each~~ various types of stormwater quality facilit~~y~~ies. ~~included in the Springfield *Engineering Design Standards and Procedures Manual*.~~ Stormwater facilities that are not included in this ~~packet~~ appendix (i.e. a manufactured stormwater treatment technology), are required to submit an O&M Plan that meets the manufacturer's requirements and facility specific operations and maintenance activities consistent with ongoing function of the stormwater facility(ies).

The O&M Plan strategies in this ~~packet~~ appendix apply to all stormwater management facilities and related facility components identified in SDC 4.3.110~~Chapter 3~~. However, Stormwater destination facilities are required to be operated and maintained in working condition for the life of the facility.

COMMENTARY: Moved "Private Facilities" and "Public Facilities" to here from above

Private Facilities:

Record a copy of the NOMA with Lane County Deeds and Records. Submit with the final site plan, a *recorded copy* of the NOMA, the O&M Agreement, and the Facility Specific Operations and Maintenance Plan (O&M Plan) for each type of stormwater management facility permitted on the site. The operations and maintenance activities listed on the O&M Plan documents, which will be on file with the City Engineer, may later be revised with City Engineer approval.

Public Facilities:

Submit a copy of a Facility Specific O&M Plan with the Public Improvement Permit Project. County recording of this plan is not necessary.

OPERATIONS AND MAINTENANCE PLAN SUBMITTALS

Privately Maintained Facilities

The *O&M Plan* for a privately maintained facility shall include the following components for each development site. A complete Plan must be submitted and approved as provided in SDC 4.3.110~~prior to issuance of the Development Agreement~~.

1. A recorded copy of the Notice of Operation and Maintenance Agreement (NOMA) ~~*See Appendix 3A-1 for a NOMA template*~~

2. Operations and Maintenance Agreement (O&M Agreement) ~~*(see Appendix 3A-2 for an O&M Agreement template)*~~

3. Stormwater Management Site Plan (as approved under the Development Agreement)

4. Landscape Plan

5. Stormwater Management Facility Inspection and Maintenance Log ~~*(see Appendix 3A-3 for an Inspection and Maintenance Log template)*~~

6. Facility-Specific Operations and Maintenance Plan(s) (O&M Plan(s)) ~~*(see Appendix 3A-4 for Facility Specific Operations and Maintenance Plans template)*~~

Detailed submission requirements for the above items are found below.

1.) ***Notice of Operations and Maintenance Agreement – (NOMA)*****:** The NOMA identifies the property as having a stormwater management facility ~~on the property~~ and identifies the responsible party for future operations and maintenance. *The Notice must be completed and recorded at Lane County Deeds and Records. Signatures on the Notice shall be notarized.* The NOMA may be submitted in person or mailed, along with payment of the applicable fees, to the County Recorder's Office. Lane County Deeds and Records, 125 E 8th Avenue, Eugene, OR 97401. ~~http://www.co.lane.or.us/AT_PropRec/default.htm~~ https://www.lanecounty.org/government/county_departments/county_administration/operations/county_clerk/real_property_recording/document_recording_requirements

The property description on the NOMA must be a full legal description of the property and may not be a tax lot number. Legal descriptions may be obtained from the county assessor's office. *The NOMA shall be printed on legal-sized (8 ½ x 14) paper to facilitate the recording process. If printed on smaller paper, additional recording fees may apply.*

2.) ***Operations and Maintenance Agreement – (O&M Agreement):*** The completed Agreement must identify the owner's name, address, and phone number, the site address, financial method used to cover future operation and maintenance, and parties responsible for inspecting and maintaining the facility. The O&M Agreement does not need to be recorded.

3.) ***Stormwater Management Site Plan:*** A copy of the Stormwater Management Site Plan shall be attached to the O&M Agreement. The Plan~~, approved as part of the Development Agreement,~~ must show the location of the facility(ies) on the site, the sources of runoff entering the facility, and the ultimate stormwater destination.

4.) ***Landscape Plan:*** A Landscape Plan (if separate from the Stormwater Management Site Plan) shall be attached to the O&M Agreement. The Plan~~, approved as part of the Development Agreement,~~ must show the location, density, plant size, quantity, and species by scientific and common name~~, plant size, and quantity~~.

5.) ***Stormwater Management Facility Inspection and Maintenance Log:*** Stormwater Management Facility Inspection and Maintenance Logs must be kept on file by the facility owner(s). Logs should note all inspection dates, the facility components that were inspected, and any maintenance or repairs made. The Facility-Specific O&M Plans can serve as a

checklist for what should be included in the Log (e.g. the facility elements that need to be inspected, frequency of inspection, conditions that indicate maintenance is needed, etc.). ~~An example of an Inspection and Maintenance Log is included in this packet (see Appendix 3A-3).~~ Logs must include the information listed in the form included in this appendix. Logs must be retained on site for a minimum of two years.

6.) ***Facility Specific Operations and Maintenance Plans – (O&M Plan):*** O&M Plans provided in this packet identify the specific operations and maintenance activities that are required for each of the approved stormwater management facilities listed in ~~Springfield *Engineering Design Standards and Procedures Manual*~~ Appendix D Stormwater Facility Details. The appropriate Plan must be attached to the O&M Agreement and submitted as part of the application process. Applicants may either select and use the pre-approved Facility Specific O&M Plans provided in this packet or prepare a Facility Specific O&M Plan that incorporates the specific activities that corresponds with their chosen type of stormwater facilities through a Type II review process. The Facility Specific O&M Plans do not have to be recorded ~~with the County~~. This allows the future stormwater management facility owner to submit operations and maintenance activity revisions to the City without the need to re-record the O&M Plans with the County.

The facility specific operations and maintenance activities for private facilities may be modified any time after permit issuance subject to mutual agreement by the City and owner, in writing. Modifying the operations and maintenance activities is optional, and is intended to give the owner an opportunity to adjust maintenance needs according to site-specific history and conditions. Modifications may require the owner to apply for concurrent modification of a prior land use approval. Proposed modifications to the O&M Plan must be submitted, along with an up-dated O&M Agreement, to the City for review and approval.

7.) ***Operations and Maintenance Plans for Proprietary Facilities:*** Proprietary ~~Operations and Maintenance~~ O&M Plans for approved proprietary facilities must describe the inspection, cleaning, and operation and maintenance criteria for the facility and provide manufacturer's recommended maintenance if applicable.

~~OPERATIONS AND MAINTENANCE ENFORCEMENT~~

~~Stormwater management facilities constructed to comply with the requirements of Springfield's *Engineering Design Standards and Procedures Manual* (EDSP Manual) shall be properly operated and maintained for the life of the facility. The O&M Agreement must identify the parties responsible for the on-going operations and maintenance of the stormwater treatment facilities. Springfield has the right and responsibility to inspect private facilities to assure they are being operated and maintained in accordance with the approved design, the O&M Agreement, the O&M Plan, and the EDSP Manual. In the event that the City finds that one or more of the stormwater management facilities on a site do not comply with the terms of the Development Agreement, including the O&M Plan required by Chapter 3 of the EDSP Manual, a written notice shall be given to the property owner listing the non-compliant aspects of the stormwater facility, including a time line for achieving compliance. In the event that the owner does not bring the stormwater management facility into compliance the City may, at its~~

~~discretion, restore the stormwater management facility to compliance and bill the property owner for the cost of the remedial actions required to restore the stormwater management facility to an operational condition.~~

COMMENTARY: The NOMA was removed from this section and will be available via the website.

Notice of Operations and Maintenance Agreement

Private Stormwater Management and Treatment System

The undersigned owner(s), is hereby given notice that stormwater runoff from the "Property" described below requires stormwater management facilities to be located, designed, and constructed in compliance with the City of Springfield's *Engineering Design and Procedures Manual*. Said facilities shall be operated and maintained in accordance with the Operations and Maintenance Agreement (O&M Agreement) on file with the City of Springfield, Development and Public Works Department.

_____ (Property Owner/Developer) acknowledges and agrees to maintain private stormwater treatment facilities listed in this document. The maintenance of the stormwater facilities listed in this document is required as part of the Development Agreement with the City of Springfield. This facility will be operated and maintained in accordance with the requirements stated in this document and in the latest edition of the City of Springfield *Engineering Design Standards and Procedures Manual,* Chapter 3. The City reserves the right to enter and inspect any stormwater facility located on the "Property" to ensure the facilities are operating as designed. Failure of the responsible party to inspect and maintain the facilities can result in an adverse impact to the public stormwater system and the quality of receiving waters.

The requirement to operate and maintain the stormwater treatment facilities in accordance with the approved site development agreement and the site O&M Agreement is binding on all current and future owners of the property. The Agreement and its O&M Plan may be modified under written consent of new owners with written approval by and re-filing with the City. The O&M Agreement and O&M Plan for facilities constructed pursuant to this notice are available at the Development and Public Works Department, 225 Fifth St, Springfield Oregon, or call (541) 736-3753, between the hours of 8 a.m. and 5 p. m., Monday through Friday.

The Subject premises, is legally described as follows: *(Tax lot number cannot be used to describe the property. Legal descriptions may be obtained from the county assessor's office).*

SEE EXHIBIT "A"

ATTACHED HERETO AND INCORPORATED HEREIN BY REFERENCE

By signing below, the signer accepts and agrees to the terms and conditions contained in the Operations and Maintenance Plan and in any documents attached. This instrument is intended to be binding upon the parties hereto, their heirs, successors, and assigns.

In Witness whereof, the undersigned has executed this instrument on this _____day of _____, 20____.

Owner(s):

Signature _____ _____

Print Name _____ _____

STATE OF OREGON, County of Lane,

This instrument as acknowledged before me this _____ day of _____, _____

By _____, owners of the above described premises.

(Please Print)

_____ _____

Notary Public for Oregon _____ My Commission Expires

COMMENTARY: The O&M Agreement will now be available via the City's website.

Operations and Maintenance Agreement

Private Stormwater Management and Treatment System

Land Development Application Number: _____

Owner's Name: _____

Phone No.: _____

Mailing Address: _____

City _____ State _____ Zip _____

Site Address: _____

City _____ State _____ Zip _____

Site Map and Tax lot No.: _____

(Or attach document with additional lot information if the facility crosses more than one lot)

Type of Stormwater Facility(ies) _____

Requirements

1) Stormwater Management Site Plan, (min. 8 1/2" x 11" attached to this form) showing the location of the facility(ies) in relation to building structures or other permanent monuments on the site, sources of runoff entering the facility(ies), and where stormwater will be discharged to after leaving the facility(ies). Landscape and vegetation should be clear on the Plan submitted or submit a separate Landscape Plan document showing vegetation type, location, and quantity (**landscape plan**). These can be the same Plans submitted for development review.

   The stormwater management facility(ies) shown on the Site Plan are a required condition of development approval for the identified property. The owner of the identified property is required to operate and maintain the facility(ies) in accordance with the **Facility Specific Operation and Maintenance Plan(s) (O&M Plan(s))** attached to this form and on file with the City. The O&M Plan for the facility(ies) will be available at the Development and Public Works Department, 225 5th Street, Springfield, Oregon between the hours of 8 a.m. and 5 p.m., Monday through Friday.

2) Financially responsible party *(circle one)*:

   Property Owner Homeowner Association Other *(describe)* _____

3) Party(ies) responsible for maintenance (only if other than owner).

   Daytime phone no. (_____) _____ - _____
   Emergency/after-hours contact phone no. (_____) _____ - _____
   Maintenance Contact Party(ies) Name & Business Address: _____
   _____

4) Maintenance practices and schedule for the stormwater facility(ies) are included in the Facility Specific O&M Plan(s) attached to this form and filed with the Development and Public Works Department, City of Springfield. The operation and maintenance practices are based on the version of the City of Eugene's Stormwater Management Manual in effect at the date of development application, as modified by any plans attached to this document at the time of signing.

Application Date: _____ _____ _____

By signing below, Filer accepts and agrees to the terms and conditions contained in the Operations and Maintenance Plan(s) and in any document executed by Filer and recorded with it.

Filer Signature: _____

COMMENTARY: This Inspection and Maintenance Log was updated to be more consistent with the Eugene log.

Stormwater Management Facility

Inspection & Maintenance Log

STORMWATER MANAGEMENT FACILITY INSPECTION AND MAINTENANCE LOG
Property Address:
Inspection Date:
Inspection Time:
Inspected By:
Approximate Date/Time of Last Rainfall:
Type of Stormwater Management Facility:
Location of Facility on Site (~~I~~in relation to buildings or other permanent structures):
Water levels and observations (ponded water (indicating poor soil permeability), oil sheen, smell, turbidity, etc.):
Sediment accumulation and/or areas of erosion?. ~~and~~ Record ~~of~~ sediment removal/erosion repair:
Condition of vegetation? ~~(Height,~~ Record survival rates, invasive species present, number of dead plants, etc.~~) and~~ Record ~~of~~ any replacement of plants and type of management (mowing, weeding, etc.):
Condition of physical properties such as inlets, outlets, piping, fences, irrigation facilities, and side slopes? Record damaged items and replacement activities:
Presence of litter? Presence of insects or damage from animals? Record removal ~~control~~ activities:

Identify safety hazards present. Record resolution activities:

COMMENTARY: Minor changes to terms were made in this section. Pages numbers will be updated upon adoption.

Facility Specific

Operations & Maintenance Plans

FACILITY SPECIFIC OPERATIONS AND MAINTENANCE PLANS	
Eco-Roofs~~, Green Roofs and Roof Gardens~~	**~~12~~**
Contained Planters	**~~14~~**
Per<u>meable</u> ~~vious~~ Pavement	**~~16~~**
Swales (Vegetated, Grassy and Street)	**~~18~~**
Level Spreaders	**~~20~~**
Vegetated Filter Strips	**~~22~~**
Stormwater Planters	**~~24~~**
Rain Gardens	**~~26~~**
Sand Filters	**~~28~~**
Soakage Trenches	**~~30~~**
Wet, Extended Wet, ~~Detention~~ and Dry ~~Detention~~ Ponds	**~~32~~**
Constructed Treatment Wetlands	**~~34~~**
Underground Detention Tanks, Vaults and Pipes	**~~36~~**
Drywells	**~~38~~**
Spill Control Manholes	**~~40~~**

Eco-Roofs~~, Green Roofs and Roof Gardens~~ Operations and Maintenance Plan
~~Roof top gardens~~ Eco-Roofs are lightweight vegetated roof systems used in place of conventional roofs that retain and filter stormwater and provide aesthetic and energy conservation benefits. All facility components, including soil substrate or growth medium, vegetation, drains, irrigation systems (if applicable), membranes, and roof structure shall be inspected for proper operations, integrity of the waterproofing, and structural stability throughout the life of the eco-roof ~~roof top garden~~. All elements shall be inspected once a month from April through September. The facility owner must keep a log, recording all inspection dates, observations, and maintenance activities. The following items shall be inspected and maintained as stated:
Soil Substrate/ Growing Medium shall be inspected for evidence of erosion from wind or water. If erosion channels are evident, they shall be stabilized with additional soil substrate/growth medium and covered with additional plants.
Structural Components shall be operated and maintained in accordance with manufacturer's requirements. Drain Inlets shall be kept unrestricted. • Inlet/outlet pipe shall be cleared when soil substrate, vegetation, debris or other materials clog the drains. Sources of sediment and debris shall be identified and corrected. • Determine if drain pipe is in good condition and correct as needed.
Debris and Litter shall be removed to prevent clogging of drains and interference with plant growth.
Vegetation shall be maintained to provide 90% plant cover. • During the Establishment Period, plants shall be replaced once per month as needed. During the long-term period, dead plants shall generally be replaced once per year in the fall months. • Fallen leaves and debris from deciduous plant foliage shall be removed if build up occurs. • Nuisance and prohibited vegetation shall be removed when discovered. • Dead vegetation shall be removed and replaced with new plants. • Weeding shall be manual with no herbicides or pesticides used. Weeds shall be removed regularly and not allowed to accumulate. • Fertilization is not necessary and fertilizers shall not be applied. • During drought conditions, mulch or shade cloth may be applied to prevent excess solar damage and water loss. • Mowing of grasses shall occur as needed. Clippings shall be removed if build up occurs.
Irrigation can be accomplished either through hand watering or automatic sprinkler systems. If automatic sprinklers are used, manufacturers' instructions for operations and maintenance shall be followed. • During the Establishment Period (1-3 years), water sufficient to assure plant establishment and not to exceed ¼ inch of water once every 3 days shall be applied. • During the long-term period (3+ years), water sufficient to maintain plant cover and not to exceed ¼ inch of water once every 14 days shall be applied.
Spill Prevention measures from mechanical systems located on roofs shall be exercised when handling substances that can contaminate stormwater. • Releases of pollutants shall be corrected as soon as identified. • The presence of a green/eco roof does not waive requirements for containment of mechanical systems.
Training and/or written guidance information for operating and maintaining rooftop gardens shall be provided to all property owners and tenants. A copy of the O&M Plan shall be provided to all property owners and tenants.
Access and Safety to the eco-roof~~top garden~~ shall be safe and efficient. • Egress and ingress routes shall be maintained to design standards. Walkways shall be clear of

obstructions and maintained to design standards.
Aesthetics of the rooftop garden shall be maintained as an asset to the property owner and community. • Evidence of damage or vandalism shall be repaired and accumulation of trash or debris shall be removed upon discovery.
Insects shall not be harbored on the eco-roof. ~~at the rooftop garden~~. • Standing water creating an environment for development of insect larvae shall be eliminated by manual means. Chemical sprays shall not be used.

Contained Planters
Operations and Maintenance Plan

Contained planters are designed to intercept rainfall that would normally fall on impervious surfaces. In this respect, contained planters convert impervious surfaces to pervious surfaces, decreasing the amount of stormwater runoff from a site. Water should drain through the planter within 3-4 hours after a storm event. All facility components and vegetation shall be inspected for proper operations and structural stability. These inspections shall occur, at a minimum, quarterly for the first 2 years from the date of installation and 2 times per year thereafter. The facility owner must keep a log, recording all inspection dates, observations, and maintenance activities. The following items shall be inspected and maintained as stated:

Filter Media consisting of sand or topsoil shall allow stormwater to percolate uniformly through the planter.

- Planter shall be excavated and cleaned, and gravel or soil shall be replaced to correct low infiltration rates.
- Holes that are not consistent with the design and allow water to flow directly through the planter to the ground shall be plugged.
- Litter and debris shall be removed routinely (e.g., no less than quarterly) and upon discovery

Planter shall contain filter media and vegetation.

- Structural deficiencies in the planter including rot, cracks, and failure shall be repaired.

Planter Reservoir receives and detains storm water prior to infiltration. If water does not drain from reservoir within 3-4 hours of storm event, sources of clogging shall be identified and corrected. Topsoil may need to be amended with sand or replaced all together.

Vegetation shall be healthy and dense enough to provide filtering while protecting underlying soils from erosion.

- Mulch shall be replenished at least annually.
- Planter vegetation shall be irrigated to ensure survival.
- Vegetation or trees that limit access or interfere with planter operation shall be pruned or removed.
- Fallen leaves and debris from deciduous plant foliage shall be raked and removed.
- Nuisance and prohibited vegetation shall be removed when discovered. Invasive vegetation contributing up to 25% of vegetation of all species (measured in a 10 x 10 foot plot) shall be removed and replaced.
- Dead vegetation shall be removed to maintain less than 10% of area coverage or when planter function is impaired. Vegetation shall be replaced within a specific timeframe, e.g., 3 months, or immediately if required to maintain cover density and control erosion where soils are exposed.

Training and/or written guidance information for operating and maintaining planters shall be provided to all property owners and tenants. A copy of the O&M Plan shall be provided to all property owners and tenants.

Access to the stormwater planter shall be safe and efficient. Egress and ingress routes shall be maintained to design standards. Roadways shall be maintained to accommodate size and weight of vehicles, if applicable.

- Obstacles preventing maintenance personnel and/or equipment access to the planter shall be removed.
- Gravel or ground cover shall be added if erosion occurs, e.g., due to vehicular or pedestrian traffic.

Insects and Rodents shall not be harbored at the stormwater planter. Pest control measures shall be taken when insects/rodents are found to be present.

- Standing water creating an environment for development of insect larvae shall be eliminated.
- If a complaint is received or an inspection reveals that a stormwater facility is significantly infested with mosquitoes or other vectors, the property owner/owners or their designee may be required to eliminate the infestation at the City inspector's discretion. Control of the infestation shall be attempted by using first nonchemical methods and secondly, only those chemical methods specifically approved by the City's inspector. Acceptable methods include but are not limited to the

following:

i. Installation of predacious bird or bat nesting boxes.
ii. Alterations of water levels approximately every 4 days in order to disrupt mosquito larval cycles.
iii. Stocking ponds and other permanent water facilities with fish or other predatory species.
iv. If non-chemical methods have proved unsuccessful, contact the City inspector prior to use of chemical methods such as the mosquito larvicides Bacillus thurengensis var. israeliensis or other approved larvicides. These materials may only be used with City inspector approval if evidence can be provided that these materials will not migrate off-site or enter the public stormwater system. Chemical larvicides shall be applied by a licensed individual or contractor.

- Holes in the ground located in and around the stormwater planter shall be filled and compacted.

Debris and Litter shall be removed to maintain soil health and to prevent interference with plant growth.

Permeable ~~vious~~ Pavement Operations and Maintenance Plan
Permeable Pavement is a porous ~~ermeable~~ pavement surface with an underlying stone reservoir that temporarily stores surface runoff before infiltrating into the subsoil or being collected in underlying drain pipes and being discharged off-site. There are many types of permeable ~~vious~~ pavement including plastic rings planted with grass, stone or concrete blocks with pore spaces backfilled with gravel or sand, porous asphalt, and porous concrete. Permeable~~vious~~ pavement accepts only precipitation, not stormwater runoff. All facility components, vegetation, and source controls shall be inspected for proper operations and structural stability, at a minimum, quarterly for the first 2 years from the date of installation, 2 times per year thereafter, and within 48 hours after each major storm event. The facility owner must keep a log, recording all inspection dates, observations, and maintenance activities. The following items shall be inspected and maintained as stated:
Surface: In most permeable ~~vious~~ pavement design, the pavement itself acts as pretreatment to the stone reservoir below. The surface shall be kept clean and free of leaves, debris, and sediment. The surface shall not be overlaid with an impermeable paving surface. • Regular sweeping shall be implemented for porous asphalt or concrete systems. Vacuum sweeping is preferred and can greatly prolong the effective life of the pavement.
Overflows or Emergency Spillways are used in the event that the facility's infiltration capacity is exceeded. Overflow devices shall be inspected for obstructions or debris, which shall be removed upon discovery. Overflow or emergency spillways shall be capable of transporting high flows of stormwater to an approved stormwater receiving system. • Sources of erosion damage shall be identified and controlled when native soil is exposed near the overflow structure.
Vegetation (where applicable) shall be healthy and dense enough to provide filtering while protecting underlying soils from erosion. Vegetation, such as trees and shrubs, should not be located in or around the permeable ~~vious~~ pavement because roots from trees can penetrate the pavement, and leaves from deciduous trees and shrubs can increase the risk of clogging the surface. • Vegetation and large shrubs/trees that limit access or interfere with porous pavement operation shall be pruned. • Fallen leaves and debris from deciduous plant foliage shall be raked and removed. • Poisonous, nuisance, dead or odor producing vegetation shall be removed immediately. • Grass shall be mowed to less than four inches and grass clippings shall be bagged and removed. • Irrigation shall be provided as needed.
Source Control measures prevent pollutants from mixing with stormwater. Typical non-structural control measures include raking and removing leaves, street sweeping, vacuum sweeping, limited and controlled application of pesticides and fertilizers, and other good housekeeping practices.
Spill Prevention measures shall be exercised when handling substances that can contaminate stormwater. A spill prevention plan shall be implemented at all non-residential sites and in areas where there is likelihood of spills from hazardous materials. However, virtually all sites, including residential and commercial, present potential danger from spills. All homes contain a wide variety of toxic materials including gasoline for lawn mowers, antifreeze for cars, solvents, pesticides, and cleaning aids that can adversely affect storm water if spilled. It is important to exercise caution when handling substances that can contaminate stormwater. Releases of pollutants shall be corrected as soon as identified. In addition, long term exposure to low levels of petroleum products, such as that form a leaky vehicle, can severely degrade the pavement.
Training and/or written guidance information for operating and maintaining permeable ~~vious~~ pavement shall be provided to all property owners and tenants. A copy of the O&M Plan shall be provided to all property owners and tenants.
Access to the permeable ~~vious~~ pavement shall be safe and efficient. Egress and ingress routes shall be maintained to design standards. Roadways shall be maintained to accommodate size and weight of

vehicles, if applicable. Obstacles preventing maintenance personnel and/or equipment access to the porous pavement shall be removed. Gravel or ground cover shall be added if erosion occurs, e.g., due to vehicular or pedestrian traffic.

Debris and Litter shall be removed to prevent clogging.

Insects and Rodents shall not be harbored at the permeable ~~vious~~ pavement. Pest control measures shall be taken when insects/rodents are found to be present.

- Standing water creating an environment for development of insect larvae shall be eliminated.
- If a complaint is received or an inspection reveals that a stormwater facility is significantly infested with mosquitoes or other vectors, the property owner/owners or their designee may be required to eliminate the infestation at the City inspector's discretion. Control of the infestation shall be attempted by using first non-chemical methods and secondly, only those chemical methods specifically approved by the City's inspector. Acceptable methods include but are not limited to the following:
  i. Installation of predacious bird or bat nesting boxes.
  ii. Alterations of pond water levels approximately every four days in order to disrupt mosquito larval development cycles.
  iii. Stocking ponds and other permanent water facilities with fish or other predatory species.
  iv. If non-chemical methods have proved unsuccessful, contact the City inspector prior to use of chemical methods such as the mosquito larvicides Bacillus thurengensis var. israeliensis or other approved larvicides. These materials may only be used with City inspector approval if evidence can be provided that these materials will not migrate off-site or enter the public stormwater system. Chemical larvicides shall be applied by a licensed individual or contractor.
- Holes in the ground located in and around the permeable ~~vious~~ pavement shall be filled and compacted.

If used at this site, the following will be applicable:

Signage may serve to educate people about the importance or function of the site's stormwater protection measures. It may also discourage behaviors that adversely affect stormwater protection measures. For example, if debris is a problem, a sign reminding people not to litter may partially solve the problem. Broken or defaced signs shall be replaced/repaired.

Placing of permeable ~~vious~~ pavement on site:

Permeable ~~vious~~ pavement should not be placed in any area where there is high likelihood of spills or contamination such as vehicle fueling areas, washing areas, loading docks, trash enclosures or material handling areas. Permeable ~~vious~~ pavement is not well suited to high traffic areas or areas where heavy vehicles will frequently travel. Such areas include parking lot lanes, entrance lanes and any areas subject to vehicle braking and turning movements. Parking lot stalls, emergency access areas and infrequently used areas are typically suitable for permeable ~~vious~~ pavement treatment.

Swales (Vegetated, Grassy and Street)
Operations and Maintenance Plan

Swales are vegetated or grassed open channels that trap pollutants by filtering and slowing flows, allowing particles to settle out. The swale should drain within 48 hours of a storm event. All facility components, vegetation, and source controls shall be inspected for proper operations and structural stability, at a minimum, quarterly for the first 2 years from the date of installation, 2 times per year thereafter, and within 48 hours after each major storm event. The facility owner must keep a log, recording all inspection dates, observations, and maintenance activities. The following items shall be inspected and maintained as stated:

Swale Inlet (such as curb cuts or pipes) shall maintain a calm flow of water entering the swale**.**

- Source of erosion shall be identified and controlled when native soil is exposed or erosion channels are forming.
- Sediment accumulation shall be hand-removed with minimum damage to vegetation using proper erosion control measures. Sediment shall be removed if it is more than 3" thick or so thick as to damage or kill vegetation.
- Inlet shall be cleared when conveyance capacity is plugged. Sources of sediment and debris shall be identified and corrected.
- Rock splash pads, spreaders and dissipaters shall be replenished to prevent erosion.

Side Slopes shall be maintained to prevent erosion that introduces sediment into the swale.

- Slopes shall be stabilized and planted using appropriate erosion control measures when native soil is exposed or erosion channels are forming.

Swale Media shall allow stormwater to percolate uniformly through the landscape swale. If the swale does not drain within 48 hours, it shall be tilled and replanted according to design specifications.

- Swale area shall be protected during construction from compaction.
- Annual or semi-annual tilling shall be implemented if compaction or clogging continues.
- Debris in quantities that inhibit operation shall be removed routinely (e.g., no less than quarterly), or upon discovery.

Swale Outlet shall maintain sheet flow of water exiting swale unless a collection drain is used. Source of erosion damage shall be identified and controlled when native soil is exposed or erosion channels are forming.

- Outlets such as drains and overland flow paths shall be cleared when 50% of the conveyance capacity is plugged.
- Outlet structures shall be cleaned of sediment and debris at least 1 time per year or when the level is at 50% of the conveyance capacity.
- Sources of sediment and debris shall be identified and corrected.

Vegetation shall be healthy and dense enough (at least 90% cover) to provide filtering while protecting underlying soils from erosion. Mulch shall be replenished as needed to ensure survival of vegetation.

- Vegetation, large shrubs or trees that interfere with landscape swale operation shall be pruned.
- Fallen leaves and debris from deciduous plant foliage shall be removed if build up is damaging vegetation.
- Grassy swales shall be mowed to keep grass 4” to 9” in height. Clippings shall be removed when possible, to remove pollutants absorbed in grasses, or when build up is damaging vegetation.
- Nuisance and prohibited vegetation (such as blackberries and English Ivy) shall be removed when discovered. Invasive vegetation contributing up to 25% of vegetation of all species shall be removed and replaced.
- Dead vegetation and woody material shall be removed to maintain less than 10% of area coverage or when swale function is impaired. Vegetation shall be replaced within 3 months, or immediately if required to maintain cover density and control erosion where soils are exposed.

Debris and Litter shall be removed to ensure stormwater conveyance and to prevent clogging of inlet and outlet drains and interference with plant growth.

Spill Prevention measures shall be exercised when handling substances that contaminate stormwater. Releases of pollutants shall be corrected as soon as identified.

Training and/or written guidance information for operating and maintaining swales shall be provided to all property owners and tenants. A copy of the O&M Plan shall be provided to all property owners and tenants.

Access to the swale shall be safe and efficient. Egress and ingress routes shall be maintained to design standards. Roadways shall be maintained to accommodate size and weight of vehicles, if applicable.

- Obstacles preventing maintenance personnel and/or equipment access to the swale shall be removed.
- Gravel or ground cover shall be added if erosion occurs, e.g., due to vehicular or pedestrian traffic.

Insects and Rodents shall not be harbored in the swale. Pest control measures shall be taken when insects/rodents are found to be present.

- If a complaint is received or an inspection reveals that a stormwater facility is significantly infested with mosquitoes or other vectors, the property owner/owners or their designee may be required to eliminate the infestation at the City inspector's discretion. Control of the infestation shall be attempted by using first non-chemical methods and secondly, only those chemical methods specifically approved by the City's inspector. Acceptable methods include but are not limited to the following:
  i. Installation of predacious bird or bat nesting boxes.
  ii. Alterations of pond water levels approximately every four days in order to disrupt mosquito larval development cycles.
  iii. Stocking ponds and other permanent water facilities with fish or other predatory species.
  iv. If non-chemical methods have proved unsuccessful, contact the City inspector prior to use of chemical methods such as the mosquito larvicides Bacillus thurengensis var. israeliensis or other approved larvicides. These materials may only be used with City inspector approval if evidence can be provided that these materials will not migrate off-site or enter the public stormwater system. Chemical larvicides shall be applied by a licensed individual or contractor.
- Holes in the ground located in and around the swale shall be filled.

If used at this site, the following will be applicable:

Check Dams, flow spreaders and dissipaters shall control and distribute flow.

- Causes for altered water flow or short circuits shall be identified, and obstructions cleared upon discovery.
- Causes for channelization shall be identified and repaired.
- Systems shall remain free of sediment build up and debris.

Level Spreaders Operations and Maintenance Plan
Level Spreaders are used to spread and disperse a concentrated flow thinly over a vegetated or forested riparian buffer or filter strip. Stormwater enters the spreader as a concentrated flow and discharges as sheet flow across a buffer area. All facility components and the vegetated buffer shall be inspected for proper operations and structural stability. These inspections shall occur, at a minimum, quarterly for the first 2 years from the date of installation, 2 times per year thereafter, and within 48 hours after each major storm event. The facility owner must keep a log, recording all inspection dates, observations, and maintenance activities. The following items shall be inspected and maintained as stated:
Level Spreader shall allow runoff to enter the vegetative filter as predominantly sheet flow. • Source of erosion damage shall be identified and controlled when native soil is exposed or erosion channels are forming. • Sediment build-up near or exceeding 2" in depth shall be removed.
Inlet shall assure unrestricted stormwater flow to the level spreader. • Sources of erosion shall be identified and controlled when native soil is exposed or erosion channels are present. • Sediment accumulation shall be hand-removed with minimum damage to vegetation using proper erosion control measures. Sediment shall be removed if it is more than 3 inches thick or so thick as to damage or kill vegetation. • Inlet shall be cleared when conveyance capacity is plugged. • Rock splash pads and dissipaters shall be replenished to prevent erosion.
Spreader lip shall allow water to exit the level spreader as sheet flow. • Sources of erosion damage shall be identified and controlled when native soil is exposed or erosion channels are deeper than 2 inches. • Outlet shall be cleared when 50% of the conveyance capacity is plugged. Sources of sediment and debris shall be identified and corrected.
Vegetated buffer shall be healthy and dense enough (at least 90% cover) to provide filtering while protecting underlying soils from erosion. • Nuisance and prohibited vegetation (such as blackberries and English Ivy) shall be removed when discovered. Invasive vegetation contributing up to 25% of vegetation of all species shall be removed and replaced. • Dead vegetation shall be removed to maintain less than 10% of area coverage or when vegetation function is impaired. Vegetation shall be replaced immediately to control erosion where soils are exposed and within 3 months to maintain cover density.
Spill Prevention measures shall be exercised when handling substances that contaminate stormwater. Releases of pollutants shall be corrected as soon as identified.
Training and/or written guidance information for operating and maintaining level spreaders shall be provided to all property owners and tenants. A copy of the O&M Plan shall be provided to all property owners and tenants.
Access to the level spreaders shall be safe and efficient. Egress and ingress routes shall be maintained to design standards. Obstacles preventing maintenance personnel and/or equipment access to the facility shall be removed.
Insects and Rodents shall not be harbored in the level spreader. Pest control measures shall be taken when insects/rodents are found to be present. • If a complaint is received or an inspection reveals that a stormwater facility is significantly infested with mosquitoes or other vectors, the property owner/owners or their designee may be required to eliminate the infestation at the City inspector's discretion. Control of the infestation shall be attempted by using first non-chemical methods and secondly, only those chemical methods specifically approved by the City's inspector. Acceptable methods include but are not limited to the following:

i. Installation of predacious bird or bat nesting boxes.
ii. Alterations of pond water levels approximately every four days in order to disrupt mosquito larval development cycles.
iii. If non-chemical methods have proved unsuccessful, contact the City inspector prior to use of chemical methods such as the mosquito larvicides Bacillus thurengensis var. israeliensis or other approved larvicides. These materials may only be used with City inspector approval if evidence can be provided that these materials will not migrate off-site or enter the public stormwater system. Chemical larvicides shall be applied by a licensed individual or contractor.

- Holes in the ground located in and around the level spreader shall be filled.

Vegetated Filter Strips
Operations and Maintenance Plan

Vegetated Filter Strips are gently sloped vegetated areas that stormwater runoff is directed to flow and filter through. Stormwater enters the filter as sheet flow from an impervious surface or is converted to sheet flow using a flow spreader. Flow control is achieved using the relatively large surface area and check dams. Pollutants are removed through infiltration and sedimentation. The vegetative filter should drain within 48 hours of storm event. All facility components and vegetation shall be inspected for proper operations and structural stability. These inspections shall occur, at a minimum, quarterly for the first 2 years from the date of installation, 2 times per year thereafter, and within 48 hours after each major storm event. The facility owner must keep a log, recording all inspection dates, observations, and maintenance activities. The following items shall be inspected and maintained as stated:

Flow Spreader shall allow runoff to enter the vegetative filter as predominantly sheet flow.

- Source of erosion damage shall be identified and controlled when native soil is exposed or erosion channels are forming.
- Sediment build-up near or exceeding 2 inch in depth shall be removed.

Filter Inlet shall assure unrestricted stormwater flow to the vegetative filter.

- Sources of erosion shall be identified and controlled when native soil is exposed or erosion channels are present.
- Sediment accumulation shall be hand-removed with minimum damage to vegetation using proper erosion control measures. Sediment shall be removed if it is more than 2 inches thick or so thick as to damage or kill vegetation.
- Inlet shall be cleared when conveyance capacity is plugged.
- Rock splash pads shall be replenished to prevent erosion.

Filter Media shall allow stormwater to percolate uniformly through the vegetative filter.

- If the vegetative filter does not drain within 48 hours, it shall be re-graded and replanted according to design specifications. Established trees shall not be removed or harmed in this process.
- Debris in quantities more than 2 inch deep or sufficient to inhibit operation shall be removed routinely (e.g., no less than quarterly), or upon discovery.

Check Dams and Dissipaters shall direct and control flow.

- Causes for altered water flow and channelization shall be identified, and obstructions cleared upon discovery.
- Cracks, rot, and structural damage shall be repaired.

Filter Outlet shall allow water to exit the vegetative filter as sheet flow, unless a collection drainpipe is used.

- Sources of erosion damage shall be identified and controlled when native soil is exposed or erosion channels are deeper than 2 inches.
- Outlet shall be cleared when 50% of the conveyance capacity is plugged. Sources of sediment and debris shall be identified and corrected.

Vegetation shall be healthy and dense enough (at least 90% cover) to provide filtering while protecting underlying soils from erosion.

- Fallen leaves and debris from deciduous plant foliage shall be raked and removed if build up is damaging vegetation.
- Nuisance and prohibited vegetation (such as blackberries and English Ivy) shall be removed when discovered. Invasive vegetation contributing up to 25% of vegetation of all species shall be removed and replaced.
- Dead vegetation shall be removed to maintain less than 10% of area coverage or when vegetative filter function is impaired. Vegetation shall be replaced immediately to control erosion where soils are exposed and within 3 months to maintain cover density.

Debris and Litter shall be removed to ensure stormwater conveyance and to prevent clogging of inlet and outlet drains and interference with plant growth.

Spill Prevention measures shall be exercised when handling substances that contaminate stormwater. Releases of pollutants shall be corrected as soon as identified.

Training and/or written guidance information for operating and maintaining vegetated filters shall be provided to all property owners and tenants. A copy of the O&M Plan shall be provided to all property owners and tenants.

Access to the vegetative filter shall be safe and efficient. Egress and ingress routes shall be maintained to design standards. Obstacles preventing maintenance personnel and/or equipment access to the facility shall be removed. Gravel or ground cover shall be added if erosion occurs, e.g., due to vehicular or pedestrian traffic.

Insects and Rodents shall not be harbored in the vegetated filter. Pest control measures shall be taken when insects/rodents are found to be present.

- If a complaint is received or an inspection reveals that a stormwater facility is significantly infested with mosquitoes or other vectors, the property owner/owners or their designee may be required to eliminate the infestation at the City inspector's discretion. Control of the infestation shall be attempted by using first non-chemical methods and secondly, only those chemical methods specifically approved by the City's inspector. Acceptable methods include but are not limited to the following:
  i. Installation of predacious bird or bat nesting boxes.
  ii. Alterations of pond water levels approximately every four days in order to disrupt mosquito larval development cycles.
  iii. Stocking ponds and other permanent water facilities with fish or other predatory species.
  iv. If non-chemical methods have proved unsuccessful, contact the City inspector prior to use of chemical methods such as the mosquito larvicides Bacillus thurengensis var. israeliensis or other approved larvicides. These materials may only be used with City inspector approval if evidence can be provided that these materials will not migrate off-site or enter the public stormwater system. Chemical larvicides shall be applied by a licensed individual or contractor.
- Holes in the ground located in and around the vegetated filter shall be filled.

Stormwater Planters Operations and Maintenance Plan
Stormwater Planters are designed to allow runoff to filter through layers of topsoil (thus capturing pollutants) and then either infiltrate into the native soils (infiltration planter) or be collected in a pipe to be discharged off-site (flow-through planter). The planter is sized to accept runoff and temporarily store the water in a reservoir on top of the soil. The flow-through planter is designed with an impervious bottom or is placed on an impervious surface. Water should drain through the planter within 3-4 hours after a storm event. All facility components and vegetation shall be inspected for proper operations and structural stability. These inspections shall occur, at a minimum, quarterly for the first 2 years from the date of installation, 2 times per year thereafter, and within 48 hours after each major storm event. The facility owner must keep a log, recording all inspection dates, observations, and maintenance activities. The following items shall be inspected and maintained as stated:
Downspout from rooftop or sheet flow from paving allows unimpeded stormwater flow to the planter. • Debris shall be removed routinely (e.g., no less than every 6 months) and upon discovery. • Damaged pipe shall be repaired upon discovery.
Splash Blocks prevent splashing against adjacent structures and convey water without disrupting media. • Any deficiencies in structure such as cracking, rotting, and failure shall be repaired.
Planter Reservoir receives and detains storm water prior to infiltration. Water should drain from reservoir within 3-4 hours of storm event. • Sources of clogging shall be identified and corrected to prevent short circuiting. • Topsoil may need to be amended with sand or replaced all together to achieve a satisfactory infiltration rate.
Filter Media consisting of sand, gravel and topsoil shall allow stormwater to percolate uniformly through the planter. The planter shall be excavated and cleaned, and gravel or soil shall be replaced to correct low infiltration rates. • Holes that are not consistent with the design and allow water to flow directly through the planter to the ground shall be plugged. • Sediment accumulation shall be hand removed with minimum damage to vegetation using proper erosion control measures. Sediment shall be removed if it is more than 4 inches thick or so thick as to damage or kill vegetation. • Litter and debris shall be removed routinely (e.g., no less than quarterly) and upon discovery.
Planter shall contain filter media and vegetation. • Structural deficiencies in the planter including rot, cracks, and failure shall be repaired.
Overflow Pipe safely conveys flow exceeding reservoir capacity to an approved stormwater receiving system. • Overflow pipe shall be cleared of sediment and debris when 50% of the conveyance capacity is plugged. • Damaged pipe shall be repaired or replaced upon discovery.
Vegetation shall be healthy and dense enough (at least 90% cover) to provide filtering while protecting underlying soils from erosion. • Mulch shall be replenished at least annually. • Vegetation, large shrubs or trees that limit access or interfere with planter operation shall be pruned or removed. • Fallen leaves and debris from deciduous plant foliage shall be raked and removed if build up is damaging vegetation. • Nuisance or prohibited vegetation shall be removed when discovered. Invasive vegetation contributing up to 25% of vegetation of all species shall be removed and replaced. • Dead vegetation shall be removed to maintain less than 10% of area coverage or when planter function is impaired. Vegetation shall be replaced within a specific timeframe, e.g., 3 months, or immediately if required to maintain cover density and control erosion where soils are exposed.

Debris and Litter shall be removed to ensure stormwater infiltration and to prevent clogging of overflow drains and interference with plant growth.

Spill Prevention measures shall be exercised when handling substances that contaminate stormwater. Releases of pollutants shall be corrected as soon as identified.

Training and/or written guidance information for operating and maintaining stormwater planters shall be provided to all property owners and tenants. A copy of the O&M Plan shall be provided to all property owners and tenants.

Access to the stormwater planter shall be safe and efficient. Egress and ingress routes shall be maintained to design standards. Roadways shall be maintained to accommodate size and weight of vehicles, if applicable.

- Obstacles preventing maintenance personnel and/or equipment access to the stormwater planter shall be removed.
- Gravel or ground cover shall be added if erosion occurs, e.g., due to vehicular or pedestrian traffic.

Insects and Rodents shall not be harbored in the stormwater planter. Pest control measures shall be taken when insects/rodents are found to be present.

- If a complaint is received or an inspection reveals that a stormwater facility is significantly infested with mosquitoes or other vectors, the property owner/owners or their designee may be required to eliminate the infestation at the City inspector's discretion. Control of the infestation shall be attempted by using first non-chemical methods and secondly, only those chemical methods specifically approved by the City's inspector. Acceptable methods include but are not limited to the following:
  i. Installation of predacious bird or bat nesting boxes.
  ii. Alterations of pond water levels approximately every four days in order to disrupt mosquito larval development cycles.
  iii. Stocking ponds and other permanent water facilities with fish or other predatory species.
  iv. If non-chemical methods have proved unsuccessful, contact the City inspector prior to use of chemical methods such as the mosquito larvicides Bacillus thurengensis var. israeliensis or other approved larvicides. These materials may only be used with City inspector approval if evidence can be provided that these materials will not migrate off-site or enter the public stormwater system. Chemical larvicides shall be applied by a licensed individual or contractor.
- Holes in the ground located in and around the stormwater planter shall be filled and compacted.

Rain Gardens Operations and Maintenance Plan
A vegetated Infiltration Basin or rain garden is a vegetated depression created by excavation, berms, or small dams to provide for short-term ponding of surface water until it percolates into the soil. The basin shall infiltrate stormwater within 24 hours. All facility components and vegetation shall be inspected for proper operations and structural stability, at a minimum, quarterly for the first 2 years from the date of installation, 2 times per year thereafter, and within 48 hours after each major storm event. The facility owner must keep a log, recording all inspection dates, observations, and maintenance activities. The following items shall be inspected and maintained as stated:
Basin Inlet shall assure unrestricted stormwater flow to the vegetated basin. • Sources of erosion shall be identified and controlled when native soil is exposed or erosion channels are present. • Inlet shall be cleared when conveyance capacity is plugged. • Rock splash pads shall be replenished to prevent erosion.
Embankment, Dikes, Berms and Side Slopes retain water in the infiltration basin. • Structural deficiencies shall be corrected upon discovery: o Slopes shall be stabilized using appropriate erosion control measures when soil is exposed/ flow channels are forming. o Sources of erosion damage shall be identified and controlled.
Overflow or Emergency Spillway conveys flow exceeding reservoir capacity to an approved stormwater receiving system. • Overflow shall be cleared when 25% of the conveyance capacity is plugged. • Sources of erosion damage shall be identified and controlled when soil is exposed. • Rocks or other armament shall be replaced when only one layer of rock exists.
Filter Media shall allow stormwater to percolate uniformly through the infiltration basin. If water remains 36-48 hours after storm, sources of possible clogging shall be identified and corrected. • Basin shall be raked and, if necessary, soil shall be excavated, and cleaned or replaced. • Infiltration area shall be protected from compaction during construction.
Sediment/ Basin Debris Management shall prevent loss of infiltration basin volume caused by sedimentation. Gauges located at the opposite ends of the basin shall be maintained to monitor sedimentation. • Sediment and debris exceeding 3 inch in depth shall be removed every 2-5 years or sooner if performance is affected.
Debris and Litter shall be removed to ensure stormwater infiltration and to prevent clogging of overflow drains and interference with plant growth. • Restricted sources of sediment and debris, such as discarded lawn clippings, shall be identified and prevented.
Vegetation shall be healthy and dense enough (at least 90% cover) to provide filtering while protecting underlying soils from erosion. • Mulch shall be replenished as needed to ensure healthy plant growth • Vegetation, large shrubs or trees that limit access or interfere with basin operation shall be pruned or removed. • Grass shall be mowed to 4"-9" high and grass clippings shall be removed no less than 2 times per year. • Fallen leaves and debris from deciduous plant foliage shall be raked and removed if build up is damaging vegetation. • Nuisance or prohibited vegetation (such as blackberries or English Ivy) shall be removed when discovered. Invasive vegetation contributing up to 25% of vegetation of all species shall be removed. • Dead vegetation shall be removed to maintain less than 10% of area coverage or when infiltration basin function is impaired. Vegetation shall be replaced within 3 months, or immediately if required

to control erosion.

Spill Prevention measures shall be exercised when handling substances that contaminate stormwater. Releases of pollutants shall be corrected as soon as identified.

Training and/or written guidance information for operating and maintaining vegetated infiltration basins shall be provided to all property owners and tenants. A copy of the O&M Plan shall be provided to all property owners and tenants.

Access to the infiltration basin shall be safe and efficient. Egress and ingress routes shall be maintained to design standards. Roadways shall be maintained to accommodate size and weight of vehicles, if applicable.

- Obstacles preventing maintenance personnel and/or equipment access to the infiltration basin shall be removed.
- Gravel or ground cover shall be added if erosion occurs, e.g., due to vehicular or pedestrian traffic.

Insects and Rodents shall not be harbored in the infiltration basin. Pest control measures shall be taken when insects/rodents are found to be present.

- If a complaint is received or an inspection reveals that a stormwater facility is significantly infested with mosquitoes or other vectors, the property owner/owners or their designee may be required to eliminate the infestation at the City inspector's discretion. Control of the infestation shall be attempted by using first non-chemical methods and secondly, only those chemical methods specifically approved by the City's inspector. Acceptable methods include but are not limited to the following:
  i. Installation of predacious bird or bat nesting boxes.
  ii. Alterations of pond water levels approximately every four days in order to disrupt mosquito larval development cycles.
  iii. Stocking ponds and other permanent water facilities with fish or other predatory species.
  iv. If non-chemical methods have proved unsuccessful, contact the City inspector prior to use of chemical methods such as the mosquito larvicides Bacillus thurengensis var. israeliensis or other approved larvicides. These materials may only be used with City inspector approval if evidence can be provided that these materials will not migrate off-site or enter the public stormwater system. Chemical larvicides shall be applied by a licensed individual or contractor.
- Holes in the ground located in and around the infiltration basin shall be filled.

If used at this site, the following will be applicable:

Fences shall be maintained to preserve their functionality and appearance.

- Collapsed fences shall be restored to an upright position.
- Jagged edges and damaged fences shall be repaired or replaced.

Sand Filters Operations and Maintenance Plan
Sand filters consist of a layer of sand in a structural box used to trap pollutants. The water filters through the sand and then flows into the surrounding soils or an underdrain system that conveys the filtered stormwater to a discharge point. All facility components, vegetation, and source controls shall be inspected for proper operations and structural stability. These inspections shall occur, at a minimum, quarterly for the first 2 years from the date of installation, and 2 times per year thereafter, and within 48 hours after each major storm event. The facility owner must keep a log, recording all inspection dates, observations, and maintenance activities. The following items shall be inspected and maintained as stated:
Filter Inlet shall allow water to uniformly enter the sand filter as calm flow, in a manner that prevents erosion. • Inlet shall be cleared of sediment and debris when 40% of the conveyance capacity is plugged. • Source of erosion damage shall be identified and controlled when native soil is exposed or erosion channels are forming. • Sediment accumulation shall be hand-removed with minimum damage to vegetation using proper erosion control measures. Sediment shall be removed if it is more than 4 inches thick or so thick as to damage or kill vegetation. • Rock splash pads shall be replenished to prevent erosion.
Reservoir receives and detains stormwater prior to infiltration. If water does not drain within 2-3 hours of storm event, sources of clogging shall be identified and correction action taken. • Debris in quantities more than 1 cu ft or sufficient to inhibit operation shall be removed routinely (e.g., no less than quarterly), or upon discovery. • Structural deficiencies in the sand filter box including rot, cracks, and failure shall be repaired upon discovery.
Filter Media shall allow to stormwater to infiltrate uniformly through the sand filter. If water remains 36-48 hours after storm, sources of possible clogging shall be identified and corrected. • Sand filter shall be raked and if necessary, the sand/gravel shall be excavated, and cleaned or replaced. • Sources of restricted sediment or debris (such as discarded lawn clippings) shall be identified and prevented. • Debris in quantities sufficient to inhibit operation shall be removed no less than quarterly, or upon discovery. • Holes that are not consistent with the design structure and allow water to flow directly through the sand filter to the ground shall be filled. • The infiltration area shall be protected from compaction during construction.
Underdrain Piping (where applicable) shall provide drainage from the sand filter, and **Cleanouts** (where applicable) located on laterals and manifolds shall be free of obstruction, and accessible from the surface. • Under-drain piping shall be cleared of sediment and debris when conveyance capacity is plugged. Cleanouts may have been constructed for this purpose. • Obstructions shall be removed from cleanouts without disturbing the filter media.
Overflow or Emergency Spillway conveys flow exceeding reservoir capacity to an approved stormwater receiving system. • Overflow spillway shall be cleared of sediment and debris when 50% of the conveyance capacity is plugged. • Source of erosion damage shall be identified and controlled when erosion channels are forming. • Rocks or other armament shall be replaced when sand is exposed and eroding from wind or rain.
Vegetation • Vegetation, large shrubs or trees that limit access or interfere with sand filter operation shall be pruned.

- Fallen leaves and debris from deciduous plant foliage shall be raked and removed.
- Nuisance or prohibited vegetation (such as blackberries or English Ivy) shall be removed when discovered. Invasive vegetation contributing up to 25% of vegetation of all species shall be removed.

Debris and Litter shall be removed to ensure stormwater infiltration and to prevent clogging.

Spill Prevention measures shall be exercised when handling substances that contaminate stormwater. Releases of pollutants shall be corrected as soon as identified.

Training and/or written guidance information for operating and maintaining sand filters shall be provided to all property owners and tenants. A copy of the O&M Plan shall be provided to all property owners and tenants.

Access to the sand filter shall be safe and efficient. Egress and ingress routes shall be maintained to design standards. Roadways shall be maintained to accommodate size and weight of vehicles, if applicable.

- Obstacles preventing maintenance personnel and/or equipment access to the facility shall be removed.
- Gravel or ground cover shall be added if erosion occurs, e.g., due to vehicular or pedestrian traffic.

Insects and Rodents shall not be harbored in the sand filter. Pest control measures shall be taken when insects/rodents are found to be present.

- If a complaint is received or an inspection reveals that a stormwater facility is significantly infested with mosquitoes or other vectors, the property owner/owners or their designee may be required to eliminate the infestation at the City inspector's discretion. Control of the infestation shall be attempted by using first non-chemical methods and secondly, only those chemical methods specifically approved by the City's inspector. Acceptable methods include but are not limited to the following:
  i. Installation of predacious bird or bat nesting boxes.
  ii. Alterations of pond water levels approximately every four days in order to disrupt mosquito larval development cycles.
  iii. Stocking ponds and other permanent water facilities with fish or other predatory species.
  iv. If non-chemical methods have proved unsuccessful, contact the City inspector prior to use of chemical methods such as the mosquito larvicides Bacillus thurengensis var. israeliensis or other approved larvicides. These materials may only be used with City inspector approval if evidence can be provided that these materials will not migrate off-site or enter the public stormwater system. Chemical larvicides shall be applied by a licensed individual or contractor.
- Holes in the ground located in and around the infiltration basin shall be filled.

Soakage Trenches Operations and Maintenance Plan
Soakage Trenches consist of drain rock and sand, and receive stormwater from roof downspouts and/or area drains. There are various components within the system – piping, silt basin and the trench itself. The **Conveyance Piping** consists of an inlet pipe (downspout or area drain), an outlet pipe located between the silt basin and the soakage trench, and a perforated pipe, located on top of the aggregate bed of the soakage trench. The **Silt Basin** is a structure receiving runoff from an inlet pipe and conveying it to the soakage trench. The silt basin serves as the pre-treatment system for the soakage trench, removing sediments and other debris that can impact its proper functioning. All facility components, vegetation, and source controls shall be inspected for proper operations and structural stability. These inspections shall occur, at a minimum, quarterly for the first two years from the date of installation, then two times per year afterwards, or within 48 hours after each major storm. The facility owner must keep a log, recording all inspection dates, observations, and maintenance activities. The following items shall be inspected and maintained as stated:
Soakage trench infiltration: If water is noticed on top of the trench within 48 hours of a major storm, the soakage trench may be clogged. • Check for debris/sediment accumulation, rake and remove and evaluate upland causes (erosion, surface or roof debris, etc. • Assess the condition of the aggregate and the filter fabric in the trench. If there is sediment in the aggregate, excavate and replace. • If there is a tear in the filter fabric, repair or replace. • The soakage trench area shall be protected from compaction during construction.
Conveyance Piping: If water ponds over the trench for more than 48 hours after a major storm and no other cause if identified, it may be necessary to remove the filter fabric to determine if the perforated pipe is clogged with sediment or debris. • Any debris or algae growth located on top of the soakage trench should be removed and disposed of properly. • If the piping has settled more than 1-inch, add fill material. If there are cracks or releases, replace or repair the pipe. If there are signs of erosion around the pipe, this may be an indication of water seeping due to a crack or break.
Silt Basin: If water remains in the soakage trench for 36-48 hours after storm, check for sediment accumulation in the silt basin • If less than 50% capacity remains in the basin or 6" of sediment has accumulated, remove and dispose the sediment.
Spill Prevention*:* Virtually all sites, including residential and commercial, present dangers from spills. All homes contain a wide variety of toxic materials including gasoline for lawn mowers, antifreeze for cars, nail polish remover, pesticides, and cleaning aids that can adversely affect groundwater if spilled. It is important to exercise caution when handling substances that can contaminate stormwater. • Activities that pose the chance of hazardous material spills shall not take place near soakage trenches.
A Shut-Off Valve or Flow-Blocking Mechanism may have been required with the construction of the soakage trench to temporarily prevent stormwater from flowing into it, in the event of an accidental material spill. This may also involve mats kept on-site that can be used to cover inlet drains in parking lots. The shut-off valve shall remain in good working order, or if mats or other flow-blocking mechanisms are used, they shall be kept in stock on-site.
Training and/or written guidance information for operating and maintaining soakage trenches shall be provided to all property owners and tenants. A copy of the O&M Plan shall be provided to all property owners and tenants.
Access to the soakage trench is required for efficient maintenance. Egress and ingress routes will be maintained to design standards at inspections.
Insects and Rodents shall not be harbored in the soakage trench. Pest control measures shall be taken

when insects/rodents are found to be present.

- If a complaint is received or an inspection reveals that a stormwater facility is significantly infested with mosquitoes or other vectors, the property owner/owners or their designee may be required to eliminate the infestation at the City inspector's discretion. Control of the infestation shall be attempted by using first non-chemical methods and secondly, only those chemical methods specifically approved by the City's inspector. Acceptable methods include but are not limited to the following:
  i. Installation of predacious bird or bat nesting boxes.
  ii. Alterations of pond water levels approximately every four days in order to disrupt mosquito larval development cycles.
  iii. Stocking ponds and other permanent water facilities with fish or other predatory species.
  iv. If non-chemical methods have proved unsuccessful, contact the City inspector prior to use of chemical methods such as the mosquito larvicides Bacillus thurengensis var. israeliensis or other approved larva ides. These materials may only be used with City inspector approval if evidence can be provided that these materials will not migrate off-site or enter the public stormwater system. Chemical larvicides shall be applied by a licensed individual or contractor.
- Holes in the ground located in and around the soakage trench shall be filled.

Wet, Extended Wet, ~~Detention~~ and Dry ~~Detention~~ Ponds Operations and Maintenance Plan
Wet Ponds are constructed ponds with a permanent pool of water. Pollutants are removed from stormwater through gravitational settling and biologic processes. **Extended Wet ~~Detention~~ Ponds** are constructed ponds with a permanent pool of water and open storage space above for retention or short-term detention of large storm events. Pollutants are removed from stormwater through gravitational settling and biologic processes. **Dry ~~Detention~~ Ponds** are constructed ponds with temporary storage for the retention or detention of large storm events. The stormwater is stored and released slowly over a matter of hours. All facility components, vegetation, and source controls shall be inspected for proper operations and structural stability. These inspections shall occur, at a minimum, quarterly for the first 2 years from the date of installation, and 2 times per year thereafter, and within 48 hours after each major storm event. The facility owner must keep a log, recording all inspection dates, observations, and maintenance activities. The following items shall be inspected and maintained as stated:
Pond Inlet shall assure unrestricted stormwater flow to the wet pond. • Inlet pipe shall be cleared when conveyance capacity is plugged. Sources of sediment and debris shall be identified and corrected. • Determine if pipe is in good condition: o If more than 1 inch of settlement, add fill material and compact soils. o If alignment is faulty, correct alignment. o If cracks or openings exist indicated by evidence of erosion at leaks, repair or replace pipe as needed.
Forebay traps coarse sediments, reduces incoming velocity, and distributes runoff evenly over the wet pond. A minimum 1-foot freeboard shall be maintained. • Sediment buildup exceeding 50% of the facility capacity shall be removed every 2-5 years or sooner if performance is being affected.
Embankment, Dikes, Berms and Side Slopes retain water in the wet pond. • Slopes shall be stabilized using appropriate erosion control measures when native soil is exposed or erosion channels are forming. • Structural deficiencies shall be corrected upon discovery: o If cracks exist, repair or replace structure. o If erosion channels deeper than 2 inches exist, stabilize surface. Sources of erosion damage shall be identified and controlled.
Control Devices (e.g., weirs, baffles, etc.) shall direct and reduce flow velocity. Structural deficiencies shall be corrected upon discovery: • If cracks exist, repair or replace structure.
Overflow Structure conveys flow exceeding reservoir capacity to an approved stormwater receiving system. • Overflow structure shall be cleared when 50% of the conveyance capacity is plugged. Sources of sediment and debris shall be identified and corrected. • Sources of erosion damage shall be identified and controlled when native soil is exposed at the top of overflow structure or erosion channels are forming. • Rocks or other armoring shall be replaced when only one layer of rock exists above native soil.

Sediment and Debris Management shall prevent loss of wet pond volume caused by sedimentation.

- Wet ponds shall be dredged when 1 foot of sediment accumulates in the pond.
- Gauges located at the opposite ends of the wet pond shall be maintained to monitor sedimentation. Gauges shall be checked 2 times per year.
- Sources of restricted sediment or debris, such as discarded lawn clippings, shall be identified and prevented.
- Debris in quantities sufficient to inhibit operation shall be removed routinely, e.g. no less than quarterly, or upon discovery.
- Litter shall be removed upon discovery.

Vegetation shall be healthy and dense enough to provide filtering while protecting underlying soils from erosion and minimizing solar exposure of open water areas.

- Mulch shall be replenished at least annually.
- Vegetation, large shrubs or trees that limit access or interfere with wet pond operation shall be pruned or removed.
- Grass (where applicable) shall be mowed to 4 inch-9 inch high and grass clippings shall be removed if build up is damaging vegetation.
- Fallen leaves and debris from deciduous plant foliage shall be raked and removed if build up is damaging vegetation.
- Nuisance or prohibited vegetation (such as blackberries or English Ivy) shall be removed when discovered. Invasive vegetation contributing up to 25% of vegetation of all species shall be removed and replaced.
- Dead vegetation shall be removed to maintain less than 10% of area coverage or when wet pond function is impaired. Vegetation shall be replaced within 3 months, or immediately if required to maintain cover density and control erosion where soils are exposed. If removing a dead or hazard tree a permit maybe required, contact the City's Public Works Department for details on tree removal.
- Vegetation producing foul odors shall be eliminated.

Spill Prevention measures shall be exercised when handling substances that can contaminate stormwater Releases of pollutants shall be corrected as soon as identified.

Training and/or written guidance information for operating and maintaining ponds shall be provided to all property owners and tenants. A copy of the O&M Plan shall be provided to all property owners and tenants.

Access to the wet pond shall be safe and efficient. Egress and ingress routes shall be maintained to design standards. Roadways shall be maintained to accommodate size and weight of vehicles, if applicable.

- Obstacles preventing maintenance personnel and/or equipment access to the wet pond shall be removed.
- Gravel or ground cover shall be added if erosion occurs, e.g., due to vehicular or pedestrian traffic.

Insects and Rodents shall not be harbored in the pond. Pest control measures shall be taken when insects/rodents are found to be present.

- If a complaint is received or an inspection reveals that a stormwater facility is significantly infested with mosquitoes or other vectors, the property owner/owners or their designee may be required to eliminate the infestation at the City inspector's discretion. Control of the infestation shall be attempted by using first non-chemical methods and secondly, only those chemical methods specifically approved by the City's inspector. Acceptable methods include but are not limited to the following:
  i. Installation of predacious bird or bat nesting boxes.
  ii. Alterations of pond water levels approximately every four days in order to disrupt mosquito larval development cycles.
  iii. Stocking ponds and other permanent water facilities with fish or other predatory species.
  iv. If non-chemical methods have proved unsuccessful, contact the City inspector prior to use of chemical methods such as the mosquito larvicides Bacillus thurengensis var. israeliensis or other

approved larvicides. These materials may only be used with City inspector approval if evidence can be provided that these materials will not migrate off-site or enter the public stormwater system. Chemical larvicides shall be applied by a licensed individual or contractor. • Holes in the ground located in and around the pond shall be filled.
If used at this site, the following will be applicable: **Signage** shall clearly convey information. • Broken or defaced signs shall be replaced or repaired.
Fences shall be maintained to preserve their functionality and appearance. • Collapsed fences shall be restored to an upright position. • Jagged edges and damaged fences and shall be repaired or replaced.

Constructed Treatment Wetlands Operations and Maintenance Plan
Constructed Treatment Wetlands remove pollutants through several processes: sedimentation, filtration, and biological processes. All facility components, vegetation, and source controls shall be inspected for proper operations and structural stability. These inspections shall occur, at a minimum, quarterly for the first 2 years from the date of installation, and 2 times per year thereafter, and within 48 hours after each major storm event. The facility owner must keep a log, recording all inspection dates, observations, and maintenance activities. The following items shall be inspected and maintained as stated:
Wetland Inlet shall assure unrestricted stormwater flow to the wetland. • Inlet pipe shall be cleared when conveyance capacity is plugged. Sources of sediment and debris shall be identified and corrected. • Determine if pipe is in good condition: o If more than 1 inch of settlement, add fill material and compact soils. o If alignment is faulty, correct alignment. o If cracks or openings exist indicated by evidence of erosion at leaks, repair or replace pipe as needed.
Forebay traps coarse sediments, reduces incoming velocity, and distributes runoff evenly over the wetland. A minimum 1-foot freeboard shall be maintained. • Sediment buildup exceeding 50% of the facility capacity shall be removed every 2-5 years or sooner if performance is being affected.
Embankment, Dikes, Berms and Side Slopes retain water in the wetland. • Slopes shall be stabilized using appropriate erosion control measures when native soil is exposed or erosion channels are forming. • Structural deficiencies shall be corrected upon discovery: o If cracks exist, repair or replace structure. o If erosion channels deeper than 2 inches exist, stabilize surface. Sources of erosion damage shall be identified and controlled.
Control Devices (e.g., weirs, baffles, etc.) shall direct and reduce flow velocity. • Structural deficiencies shall be corrected upon discovery: o If cracks exist, repair or replace structure.
Overflow Structure conveys flow exceeding reservoir capacity to an approved stormwater receiving system. • Overflow structure shall be cleared when 50% of the conveyance capacity is plugged. Sources of sediment and debris shall be identified and corrected. • Sources of erosion damage shall be identified and controlled when native soil is exposed at the top of overflow structure or erosion channels are forming. • Rocks or other armament shall be replaced when only one layer of rock exists above native soil.
Sediment and Debris Management shall prevent loss of wetland volume caused by sedimentation. • Wetlands shall be dredged when 1 foot of sediment accumulates. • Gauges located at the opposite ends of the wetland shall be maintained to monitor sedimentation. Gauges shall be checked 2 times per year. • Sources of restricted sediment or debris, such as discarded lawn clippings, shall be identified and prevented. • Debris in quantities sufficient to inhibit operation shall be removed routinely, e.g. no less than quarterly, or upon discovery. • Litter shall be removed upon discovery.
Vegetation shall be healthy and dense enough to provide filtering while protecting underlying soils from erosion and minimizing solar exposure of open water areas. • Mulch shall be replenished when needed. • Vegetation, large shrubs or trees that limit access or interfere with wetland operation shall be pruned.

- Fallen leaves and debris from deciduous plant foliage shall be raked and removed.
- Nuisance or prohibited vegetation (such as blackberries or English Ivy) shall be removed when discovered. Invasive vegetation contributing up to 25% of vegetation of all species shall be removed and replaced.
- Dead vegetation shall be removed to maintain less than 10% of area coverage or when wetland function is impaired. Vegetation shall be replaced within 3 months, or immediately if required to maintain cover density and control erosion where soils are exposed.
- Vegetation producing foul odors shall be eliminated.

Spill Prevention measures shall be exercised when handling substances that can contaminate stormwater Releases of pollutants shall be corrected as soon as identified.

Training and/or written guidance information for operating and maintaining treatment wetlands shall be provided to all property owners and tenants. A copy of the O&M Plan shall be provided to all property owners and tenants.

Access to the wetland shall be safe and efficient. Egress and ingress routes shall be maintained to design standards. Roadways shall be maintained to accommodate size and weight of vehicles, if applicable.

- Obstacles preventing maintenance personnel and/or equipment access to the wetland shall be removed.
- Gravel or ground cover shall be added if erosion occurs, e.g., due to vehicular or pedestrian traffic.

Insects and Rodents shall not be harbored in the constructed treatment wetland. Pest control measures shall be taken when insects/rodents are found to be present.

- If a complaint is received or an inspection reveals that a stormwater facility is significantly infested with mosquitoes or other vectors, the property owner/owners or their designee may be required to eliminate the infestation at the City inspector's discretion. Control of the infestation shall be attempted by using first non-chemical methods and secondly, only those chemical methods specifically approved by the City's inspector. Acceptable methods include but are not limited to the following:
  i. Installation of predacious bird or bat nesting boxes.
  ii. Alterations of pond water levels approximately every four days in order to disrupt mosquito larval development cycles.
  iii. Stocking ponds and other permanent water facilities with fish or other predatory species.
  iv. If non-chemical methods have proved unsuccessful, contact the City inspector prior to use of chemical methods such as the mosquito larvicides Bacillus thurengensis var. israeliensis or other approved larvicides. These materials may only be used with City inspector approval if evidence can be provided that these materials will not migrate off-site or enter the public stormwater system. Chemical larvicides shall be applied by a licensed individual or contractor.
- Holes in the ground located in and around the constructed treatment wetland shall be filled.

If used at this site, the following will be applicable:

Signage shall clearly convey information.

- Broken or defaced signs shall be replaced or repaired.

Fences shall be maintained to preserve their functionality and appearance.

- Collapsed fences shall be restored to an upright position.
- Jagged edges and damaged fences and shall be repaired or replaced.

Underground Detention Tanks, Vaults and Pipes Operations and Maintenance Plan
Underground Detention Tanks, Vaults, and Pipes are designed to fill with stormwater during large storm events, slowly releasing it over a number of hours. There are numerous components to each system. **Drain Inlet Pipes** convey stormwater into the detention facility. The **Detention Chamber** is the structure in which stormwater accumulates during a storm event. **Orifice Structure/ Outlet Drain Pipe** restricts the flow out of the detention chamber, allowing it to fill up and slowly drain out. The orifice structure is located at the downstream end of the detention chamber. Underground facilities shall be inspected quarterly and within 48 hours after each major storm event. The facility owner must keep a log, recording all inspection dates, observations, and maintenance activities. The following items shall be inspected and maintained as stated:
Proprietary Structures such as oil-water separators, sedimentation manholes, grit chambers, etc. are required to have an O&M plan submitted with material from the manufacturer for that specific product for the O&M Agreement. • If such material is not available or satisfactory for maintenance needs, city staff will assist developer/property owner in preparing the O&M plan.
Drain Inlet Pipes shall be inspected for clogging or leaks where it enters the vault or basin during every inspection and cleanout. • Debris/sediment that is found to clog the inlet shall be removed, and disposed of in accordance with applicable federal and state requirements.
Detention Chamber shall be inspected for cracks or damage during each inspection. • The detention chamber shall be cleaned out yearly or after an inch of sediment has accumulated. If there is a valve on the outlet pipe it shall be closed otherwise the outlet shall be plugged prior to cleanout. Grit and sediment that has settled to the bottom of the chamber shall be removed during each cleaning. • Water and sediment in the detention chamber shall be removed, and disposed of in accordance with regulations. • Cleaning shall be done without use of detergents or surfactants. A pressure washer may be used if necessary.
Orifice Structure/ Outlet Drain Pipe shall be inspected for clogging during unit inspections/cleanouts. • Debris/sediment that is found to clog the inlet shall be removed, and disposed of in accordance with applicable federal and state requirements.
Vegetation such as trees should not be located in or around the detention facility because roots from trees can penetrate the unit body, and leaves from deciduous trees and shrubs can increase the risk of clogging the intake pipe. • Large shrubs or trees that are likely to interfere with detention facility operation shall be identified at each inspection then removed.
Source Control measures typically include structural and non-structural controls. Non-structural controls can include street sweeping and other good housekeeping practices. It is often easier to prevent pollutants from entering stormwater than to remove them. • Source control measures shall be inspected and maintained (where applicable).
Spill Prevention procedures require high-risk site users to reduce the risk of spills. However, virtually all sites, including residential and commercial, present dangers from spills. Homes contain a wide variety of toxic materials including gasoline for lawn mowers, antifreeze for cars, pesticides, and cleaning aids that can adversely affect storm water if spilled. It is important for everyone to exercise caution when handling substances that can contaminate stormwater. Spill prevention procedures shall be implemented in areas where there is likelihood of spills from hazardous materials.
Training and/or written guidance information for operating and maintaining detention facilities shall be provided to all property owners and tenants. A copy of the O&M Plan shall be provided to all property owners and tenants.

Access to the detention facility is required for efficient maintenance. Egress and ingress routes shall be open and maintained to design standards.
Signage may serve to educate people about the importance or function of the site's stormwater protection measures. Signs may also discourage behavior that adversely impacts the stormwater protection measures and encourages behavior that enhances or preserves stormwater quality. If debris is a problem, a sign reminding people not to litter may partially solve the problem. Signage (where applicable) will be maintained and repaired as needed during or shortly after inspections.
Insects and Rodents shall not be harbored in the detention facility. Pest control measures shall be taken when insects/rodents are found to be present • If a complaint is received or an inspection reveals that a stormwater facility is significantly infested with mosquitoes or other vectors, the property owner/owners or their designee may be required to eliminate the infestation at the City inspector's discretion. Control of the infestation shall be attempted by using first non-chemical methods and secondly, only those chemical methods specifically approved by the City's inspector. Acceptable methods include but are not limited to the following: i. Installation of predacious bird or bat nesting boxes. ii. Alterations of pond water levels approximately every four days in order to disrupt mosquito larval development cycles. iii. Stocking ponds and other permanent water facilities with fish or other predatory species. iv. If non-chemical methods have proved unsuccessful, contact the City inspector prior to use of chemical methods such as the mosquito larvicides Bacillus thurengensis var. israeliensis or other approved larvicides. These materials may only be used with City inspector approval if evidence can be provided that these materials will not migrate off-site or enter the public stormwater system. Chemical larvicides shall be applied by a licensed individual or contractor. • Holes in the ground located in and around the detention facility shall be filled.

Drywells Operations and Maintenance Plan
Drywells are designed to infiltrate stormwater into the ground. Stormwater is piped to drywells from roof downspouts or pollution control facilities such as swales or planters. The pollution control facility is designed to settle out sediments and separate oils and greases from the water before releasing it through a pipe to the drywell. This prolongs the life of the drywell and helps to prevent the contamination of soils and groundwater. The drywell is a concrete or plastic manhole section with many small holes in the sides to allow stormwater to infiltrate into the surrounding soil. The drywell system shall be inspected and cleaned quarterly and within 48 hours after each major storm event. The facility owner must keep a log, recording all inspection dates, observations, and maintenance activities. Drywells are considered Underground Injection Wells in Oregon and are subject to State regulations for permitting and testing by the Oregon DEQ. The following items shall be inspected and maintained as stated:
Stormwater Drain Pipe shall be inspected for clogging or leaks where it enters the drywell. • Debris/sediment that is found to clog the pipe shall be removed and disposed of in accordance with applicable federal and state requirements.
Drywell shall be inspected during each cleanout. Ponding around the catch basins or sedimentation manhole or drywell lids may indicate that the drywell is failing due to siltation, or the clogging of the sediment pores surrounding the drywell. Clogged drywells must be replaced.
Vegetation such as trees should not be located in or around the drywell because roots from trees can penetrate the unit body, and leaves from deciduous trees and shrubs can increase the risk of clogging the intake pipe. • Large shrubs or trees that are likely to interfere with operation will be identified at each inspection and removed.
Source Control measures typically include structural and non-structural controls. Non-structural controls can include parking lot or street sweeping and other good housekeeping practices. It is often easier to prevent pollutants from entering stormwater than to remove them. • Source control measures shall be inspected and maintained (where applicable).
Spill Prevention procedures require high-risk site users to reduce the risk of spills. However, virtually all sites, including residential and commercial, present dangers from spills. Homes contain a wide variety of toxic materials including gasoline for lawn mowers, antifreeze for cars, solvents, pesticides, and cleaning aids that can adversely affect storm water if spilled. It is important to exercise caution when handling substances that can contaminate stormwater. Spill prevention procedures shall be implemented in areas where there is likelihood of spills from hazardous materials.
A Shut-Off Valve or Flow-Blocking Mechanism may have been required with the construction of the drywell to temporarily prevent stormwater from flowing into it, in the event of an accidental material spill. This may also involve mats kept on-site that can be used to cover inlet drains in parking lots. The shutoff valve shall remain in good working order, or if mats or other flow-blocking mechanisms are used, they shall be kept in stock on-site.
Training and/or written guidance information for operating and maintaining drywell systems shall be provided to all property owners and tenants. A copy of the O&M Plan shall be provided to all property owners and tenants.
Access to the drywell is required for efficient maintenance. Egress and ingress routes shall be open and maintained to design standards. • City inspection staff may require owners to provide proof of registration, permitting and maintenance logs for the facility as required by the Oregon DEQ.
Insects and Rodents shall not be harbored in the drywell. Pest control measures shall be taken when insects/rodents are found to be present. • If a complaint is received or an inspection reveals that a stormwater facility is significantly infested with mosquitoes or other vectors, the property owner/owners or their designee may be required to eliminate the infestation at the City inspector's discretion. Control of the infestation shall be

attempted by using first non-chemical methods and secondly, only those chemical methods specifically approved by the City's inspector. Acceptable methods include but are not limited to the following:

i. Installation of predacious bird or bat nesting boxes.
ii. Alterations of pond water levels approximately every four days in order to disrupt mosquito larval development cycles.
iii. Stocking ponds and other permanent water facilities with fish or other predatory species.
iv. If non-chemical methods have proved unsuccessful, contact the City inspector prior to use of chemical methods such as the mosquito larvicides Bacillus thurengensis var. israeliensis or other approved larvicides. These materials may only be used with City inspector approval if evidence can be provided that these materials will not migrate off-site or enter the public stormwater system. Chemical larvicides shall be applied by a licensed individual or contractor.

- Holes in the ground located in and around the drywell shall be filled.

Signage may serve to educate people about the importance or function of the site's stormwater protection measures. Signs may also discourage behavior that adversely impacts the stormwater protection measures and encourages behavior that enhances or preserves stormwater quality. If debris is a problem, a sign reminding people not to litter may partially solve the problem. Signage (where applicable) shall be maintained and repaired as needed during or shortly after inspections.

Spill Control Manholes Operations and Maintenance Plan
Spill Control Manholes operate using the principal that oil and water are immiscible (do not mix) and have different densities. Oil, being less dense than water, floats to the surface. The spill control manhole shall be inspected and cleaned quarterly. The facility owner must keep a log, recording all inspection dates, observations, and maintenance activities. The following items shall be inspected and maintained as stated:
Stormwater Drain Inlet Pipe shall be inspected for clogging or leaks where it enters the manhole during every inspection and cleanout. Debris/sediment that is found to clog the inlet shall be removed, tested, and disposed of in accordance with applicable federal and state requirements.
Manhole Chamber shall be inspected for cracks or damage during each inspection. • The manhole shall be cleaned out quarterly. Cleanout shall be done in a manner to minimize the amount of trapped oil entering the outlet pipe. If there is a valve on the outlet pipe it shall be closed otherwise the outlet will be plugged prior to clean-out. • Water and oil shall be removed, tested, and disposed of in accordance with regulations. Grit and sediment that has settled to the bottom of the chamber shall be removed during each cleaning • Cleaning shall be done without use of detergents or surfactants. A pressure washer along with a vacuum may be used if necessary.
Absorbent Pillows and Pads (where applicable) absorb oil from the separation chamber. • Replacement shall occur at least twice a year, in the spring and fall, or as necessary to retain oil-absorbing function.
Stormwater Drain Outlet Pipe shall be inspected for clogging or leaks where it exits the manhole. Particular attention shall be paid to ensure that the joint where the tee joins the outlet pipe is watertight. • Debris/sediment that is found to clog the outlet shall be removed, tested, and disposed of in accordance with applicable federal and state requirements.
Vegetation such as trees should not be located in or around the spill control manhole because roots can penetrate the unit body, and leaves from deciduous trees and shrubs can increase the risk of clogging. • Large shrubs or trees that are likely to interfere with manhole operation shall be identified at each inspection and removed.
Source Control measures typically include structural and non-structural controls. Non-structural controls can include street sweeping and other good housekeeping practices. • Source control measures shall be inspected and maintained.
Spill Prevention procedures require high-risk site users to reduce the risk of spills. However, virtually all sites, including residential and commercial, present dangers from spills. Homes contain a wide variety of toxic materials including gasoline for lawn mowers, antifreeze for cars, pesticides, and cleaning aids that can adversely affect storm water if spilled. It is important to exercise caution when handling substances that can contaminate stormwater. Spill prevention procedures shall be implemented in areas where there is likelihood of spills from hazardous materials.
Training and/or written guidance information for operating and maintaining spill control manholes shall be provided to all property owners and tenants. A copy of the O&M Plan shall be provided to all property owners and tenants.
Access to the spill control manhole is required for efficient maintenance. Egress and ingress routes shall be open and maintained to design standards.
Insects and Rodents shall not be harbored in the spill control manhole. Pest control measures shall be taken when insects/rodents are found to be present. • If a complaint is received or an inspection reveals that a stormwater facility is significantly infested with mosquitoes or other vectors, the property owner/owners or their designee may be required to eliminate the infestation at the City inspector's discretion. Control of the infestation shall be attempted by using first non-chemical methods and secondly, only those chemical methods specifically approved by the City's inspector. Acceptable methods include but are not limited to the

following:

i. Installation of predacious bird or bat nesting boxes.
ii. Alterations of pond water levels approximately every four days in order to disrupt mosquito larval development cycles.
iii. Stocking ponds and other permanent water facilities with fish or other predatory species.
iv. If non-chemical methods have proved unsuccessful, contact the City inspector prior to use of chemical methods such as the mosquito larvicides Bacillus thurengensis var. israeliensis or other approved larvicides. These materials may only be used with City inspector approval if evidence can be provided that these materials will not migrate off-site or enter the public stormwater system. Chemical larvicides shall be applied by a licensed individual or contractor.

- Holes in the ground located in and around the manhole shall be filled.

Signage may serve to educate people about the importance or function of the site's stormwater protection measures. Signage (where applicable) shall be maintained and repaired as needed during or shortly after inspections.

Explanation of Appendices to the Springfield Development Code Appendix F Approved Vegetation List to Incorporate MS4 Permit Requirements

PROPOSED AMENDMENTS

Various sections of the Springfield Development Code (SDC) are amended to remove barriers to Low-Impact Development (LID) and define key stormwater terms. This appendix is proposed to be moved to the SDC from the Engineering Design Standards and Procedures Manual (EDSPM). The purpose of this is provide minimum criteria for planting design. The proposed amendments are shown in legislative format (deleted text with strike-thru red font and new text with double underline red font). Commentary is shown in *purple italics font*, preceding the text to which it is referring.

COMMENTARY: Changed facility planting zones to be consistent with the Eugene's 2014 Stormwater Management Manual Appendix D Facility Planting Design, including removing the "W" or "wet" zone. Removed diagrams from and references to Portland's old Stormwater Management Manual.

Removed Grassy Swale Native Seed Mix. Examples of species that can be planted as seed are identified in new Facility Plant List.

The most common plants for stormwater facilities were retained and are presented in the new Facility Plant List.

APPENDIX ~~6B~~ F

APPROVED VEGETATION LIST

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~~APPENDIX 6B~~
~~APPROVED VEGETATION LIST~~

Facility Planting Zones

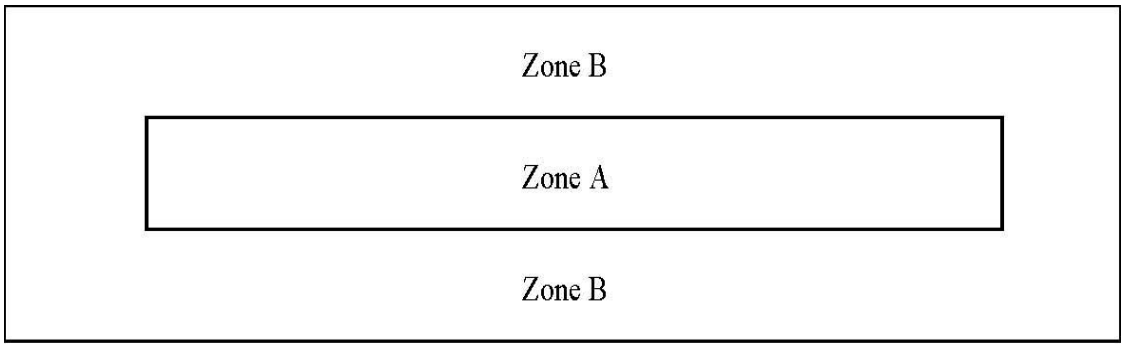
Zone A: Area of the facility defined as the bottom of the facility to the designated high-water mark. This area has moist to wet soils and plants located here shall be tolerant of mild inundation.

Zone B: Area of the facility defined as the side slopes from the designated high-water ~~line~~ mark up to the edge of the facility. This area typically has dryer to moist soils, with the moist soils being located further down the side slopes. Plants here should be drought tolerant and help stabilize the slopes.

~~**Zone C/D:** Area of the facility defined by the depth of the soil.~~

~~**Zone W:** Area of the facility defined as the bottom of the facility up to 1foot up the side slopes. Wetland herbaceous plants (aquatic and emergent) Emergent wet to saturated.~~

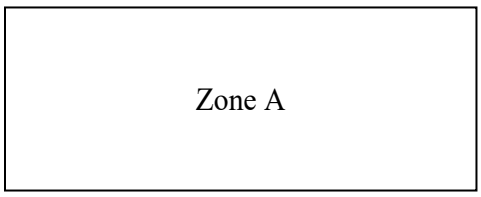
~~Vegetated~~ Swale~~, Filter Strips~~ Planting Zones



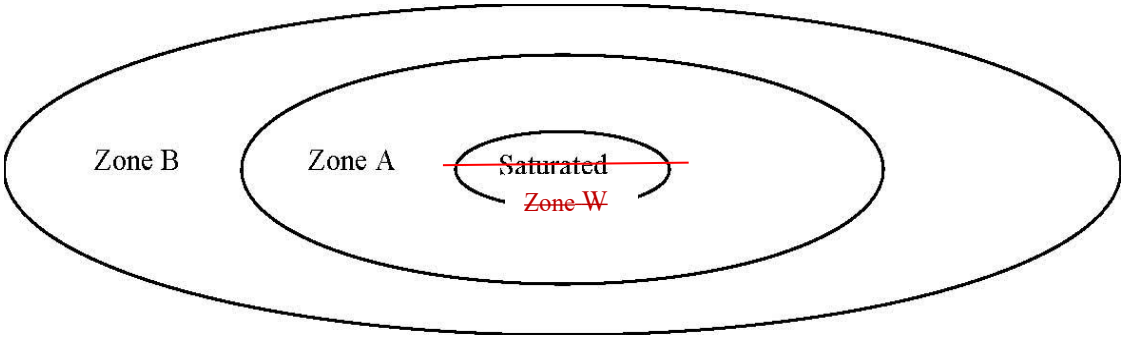
~~Contained~~ Planter Planting Zones

~~**Note:** Generally, plants requiring **moist-wet (M/W)** conditions are preferred for flow-through facilities.~~

~~Plants requiring **moist to dry (M/D) and wet to dry (W/D)** conditions are preferred for infiltration facilities.~~

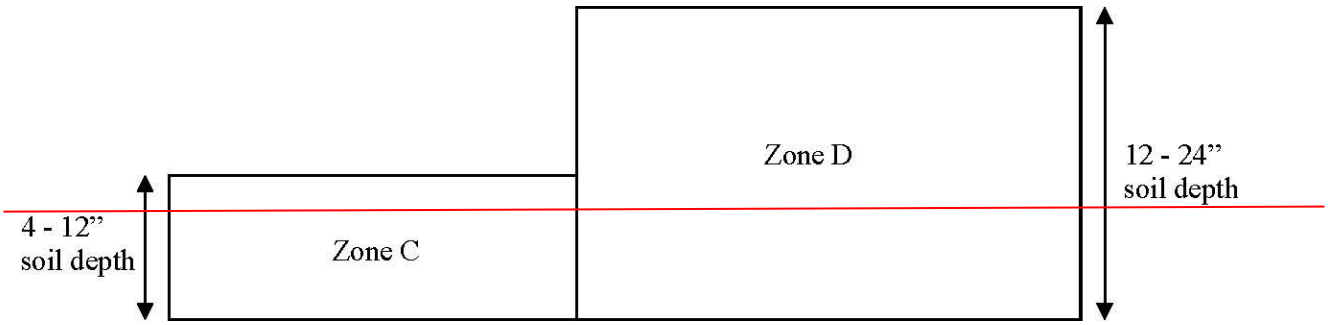


~~Basin, Infiltration Planter,~~ Rain Garden~~, Ponds, and Constructed Wetlands~~ Planting Zones



~~Eco-roof Planting Zones~~

~~For roof garden plants, it is recommended to use drought tolerant, self-sustaining native, shrubs and eco-roof plants.~~



~~Grassy Swale Native Seed Mix~~

~~Percentages are by weight:~~

~~*Hordeum brachyantherum* (Meadow Barley) = 25%~~
~~*Danthonia californica* (California Oat-grass) = 15%~~
~~*Elymus glaucus* (Blue Wild Rye) = 10%~~
~~*Bromus carinatus* (California Brome) = 10%~~
~~*Festuca romerii* (Roemer's fescue) = 10%~~
~~*Deschampsia cespitosa* (Tufted hairgrass) = 10%~~
~~*Agrostis exarata* (Spike bentgrass) = 10%~~
~~*Alopecurus geniculatus* (Water foxtail) = 5%~~
~~*Deschampsia elongata* (Slender hairgrass) = 5%~~

COMMENTARY: Added criteria for approval of species not on the list (ease of maintenance and benefit to water and soil quality). Added that non-native invasive plants are not allowed in stormwater facilities, and that only natives are allowed in stormwater facilities within Natural Resource Protection Area setbacks. Added criteria for species diversity (minimum of three unique species per facility).

The Facility Plant List table below is proposed to be replaced with a new table that contains the same information but includes columns for "Groundcovers" and "Sun Exposure." The "Groundcover" column was added to be consistent with Eugene's 2014 Stormwater Management Manual Appendix D Facility Planting Design. The "Sun Exposure" column was added to provide some additional information on the preferred light conditions of the plant species.

Facility types were changed to be consistent with Eugene's 2014 Stormwater Management Manual Appendix D Facility Planting Design (Grassy Swales, Vegetated Swales/Filter Strips, Stormwater Planters, Rain Gardens/Dry Detention Ponds, and Wet/Extended Wet Ponds). On-center spacing and planting zone were adjusted based on feedback from facility designers and maintainers.

*Other formatting changes to the table below include the elimination of the "W" or "Wet" soil moisture category. The species that are pre-approved for public facilities are now shown in **bold** with an asterisk*. Genus and species names were updated.*

The species changes below were made based on the feedback from facility designers and maintainers, and comparisons with Eugene's 2014 Stormwater Management Manual Appendix D Facility Planting Design and Portland's 2020 Stormwater Management Manual Private Stormwater Facilities Plant List. A number of annual, ornamental, and difficult to maintain species were removed. Ash and cottonwood trees were removed due to their size and ability to spread. Most willow species were removed due to their ability to spread and their size. Several tree species were also removed because of their size.

Added species

Herbaceous Plants:		
	Asclepias speciosa	*Showy Milkweed*
	Rubus calycinoides* (pentalobus)	***Creeping Bramble***
	Solidago canadensis	*Canada Goldenrod*
	Viola glabella	*Stream Violet*
Shrubs:		
	Spiraea spp.*	***Dwarf Spirea***
Trees:		
	Abies koreana	*Silver Korean Fir*
	Arbutus x 'Marina'	*Marina Strawberry Tree*
	Arbutus unedo	*Strawberry Madrone*
	Carpinus betulus	*European Hornbeam*
	Celtis occidentalis	*Common Hackberry*
	x Chitalpa tashkentensis	*Chitalpa*
	Lagerstroemia indica x fauriei	*Crepe Myrtle*
	Nyssa sylvatica	*Black Tupelo*
	Parrotia persica	*Persian Ironwood*
	Pistacia chinesis	*Chinese Pistache*
	Quercus bicolor	*Swamp White Oak*
	Quercus douglasii	*Blue Oak*
	Quercus shumardii	*Shumard Oak*
	Quercus suber	*Cork Oak*
	Taxodium distichum	*Bald Cypress*

Removed species

Herbaceous Plants:

Camassia leichtlinii	*Camas Lily, Large Camas*
Camassia quamash	*Common Camas*
Carex testacea	*New Zealand Orange Sedge*
Clarkia amoena	*Summer's Darling, Farewell To Spring*
Clarkia purpurea	*Four Spot, Godetia*
Collomia grandiflora	*Large Leaf Collomia*
Deschampsia elongate	*Slender Hairgrass*
Dichelostemma congestum	*Ookow*
Downingia elegans	*Calico Flower*
Elymus trachycaulus	*Slender or Bearded Wheatgrass*
Epilobium densiflora	*Dense Spike Primrose*
Hebe 'Autumn Glory'	*Hebe*
Helictotrichon sempervirens	*Blue Oat Grass*
Iris sibirica	*Siberian Iris*
Lemna minor	*Common Lesser Duckweed*
Lupinus micranthus	*Small Flowered Lupine*
Madia elegans	*Showy Tarweed*
Myosotis laxa	*Small -flowered Forget-Me-Not*
Plagiobothrys figuratus	*Popcorn Flower*
Polypodium glycrrhiza	*Licorice Fern*
Potamogeton natans	*Floating-leafed Pondweed*
Potentilla gracilis var. Gracilis	*Graceful Cinquefoil*
Prunella vulgaris var. vulgaris	*Heal All*
Pteridium aquilinum	*Bracken Fern*
Ranunculus occidentalis	*Western Buttercup*
Sedum oreganum	*Oregon Stonecrop*
Sidalcea nelsoniana	*Nelson's Checkermallow*
Sisyrinchium californicum	*Yellow-eyed Grass*
Sparganium emersum	*Narrowleaf Bur-reed*
Veronica Americana	*American Speedwell, Brooklime*
Veronica liwanensis	*Speedwell*
Viola palustris	*Marsh Violet*

Shrubs:

Salix fluviatalis	*Columbia Willow*
Salix purpurea nana	*Blue Arctic Willow*
Salix sessilifolia	*Soft Leafed Willow*
Salix stichensis	*Sitka Willow*
Rosa gymnocarpa	*Baldhip Rose*
Rosa nutkana	*Nootka Rose*
Rosa pisocarpa	*Swamp Rose*

Trees:

Abies grandis	*Grand Fir*
Acer macrophyllum	*Big Leaf Maple*
Betula papyrifera, var. papyrifera,	*Paperbark Birch*
Calocedrus decurrens	*Incense Cedar*
Castanopsis chrysopylla	*Chinquapin, Giant, Golden*
Corylus cornuta	*California Hazelnut*
Fraxinus latifolia	*Oregon Ash*

Metasequoia glyptostroboides Dawn Redwood

Pinus monticola	*Western White Pine*
Pinus ponderosa	*Ponderosa Pine*
Populus balsamifera	*Black Cottonwood*
Populus tremuloides	*Quaking Aspen*
Prunus emarginata var. mollis (or P. virginiana)	*Bitter or Choke Cherry*
Pseudotsuga menziesii	*Douglas Fir*
Salix hookeriana	*Hooker's Willow, Piper's Willow*
Salix scouleriana	*Scouler's Willow*
Sequoia sempervirons	*Coast Redwood*
Thuja plicata	*Western Red Cedar*
Tsuga hetrophylla	*Western Hemlock*
Tsuga mertensiana	*Mountain Hemlock*

Facility Plant List

Note: Alternative plants not found on this list may be approved based on ease of maintenance and beneficial impacts to water and soil quality. ~~allowed with approval from City staff.~~ Non-native invasive plants are not allowed. Only native plants are allowed in stormwater facilities within Natural Resource Protection Area setbacks (SDC 4.3-117.F.4). Each stormwater facility must have a minimum of three unique species.

Plant Name		**Proposed Facility Type**					**Characteristics**			
		Private and Public except where noted				**Public**				
***Botanic Name,* Common Name**	**Zone**	**Swale/Filter Strips**	**Contained Planter**	**Basin Infil. Planter Rain Garden Dry Pond**	**Wet Ponds C. Wetlands**	**Basins Ponds**	**NW Native**	**Evergreen**	**Potential Height**	**O.C. Spacing**
Herbaceous Plants, Ferns, Grasses										
Agrostis exarata, Spike Bentgrass	A	X	W/D	X		X	Y	N	36”	12”
Alisma plantago-aquatica var. americanum, Water Plantain	W				X	X	Y	N	24”	12"
Allium acuminatum, Hooker’s Onion, Tappertip	A		M/D				Y	N	12”	12”
Allium amplectens, Slim Leaf Onion, Narrowleaf	A		M/D				Y	N	12”	12”
Alopecurus geniculatus, Water Foxtail	A	X		X	X	X	Y	Y	18”	12"
Aster hallii Hall’s Aster	A/B	X		X	X	X	Y	N	36”	12”
Aster suspicatus, Douglas Aster	A/B W	X		X	X	X	Y	N	36”	12”
Athyrium felix-femina, Lady Fern	B	X	M	X		X	Y	N	36”	24"
Beckmannia syzigachne, American Slough Grass	A		M/W	X	X	X	Y	N	36”	12”
Bidens cernua, Nodding Beggerticks	A/B W				X	X	Y	N	24"	12"
Blechnum spicant, Deer Fern	B/W	X	M	X	X	X	Y	N	24"	24"
Brodiaea coronaria, Harvest Brodiaea, Crown Brodiaea	A		M/D				Y	N	36”	12”
Bromus carinatus, Califonia Brome Grass	A/B	X	M/D	X	X	X	Y	Y	18”	12"
Bromus sitchensis, Alaska Brome, Sitka	A/B	X	M/D	X	X	X	Y	Y	18”	12"
Bromus vulgaris, Columbia Brome	A/B	X	M/D	X	X	X	Y	Y	18”	12"
~~*Camassia leichtlinii, Camas Lily, Large Camas*~~	~~A~~	~~X~~	~~X~~	~~X~~		~~X~~	~~Y~~	~~N~~	~~24”~~	~~12"~~
~~*Camassia quamash,* Common Camas~~	~~A/B~~	~~X~~	~~M/D~~	~~X~~	~~X~~	~~X~~	~~Y~~	~~N~~	~~24”~~	~~12"~~
Carex deweyanna, Dewey Sedge	A/B	X	M/W	X	X	X	Y	Y	36”	12"

Plant Name		Proposed Facility Type					Characteristics			
		Private and Public except where noted				Public				
Botanic Name, Common Name	Zone	Swale/Filter Strips	Contained Planter	Basin Infil. Planter Rain Garden Dry Pond	Wet Ponds C. Wetlands	Basins Ponds	NW Native	Evergreen	Potential Height	O.C. Spacing
Carex densa, Dense Sedge	A	X	M/W	X	X	X	Y	Y	24”	12"
Carex hendersonii, Henderson Sedge	A			X	X	X	Y	Y	40”	24”
Carex obnupta, Slough Sedge	A/W	X	M/W	X	X	X	Y	Y	4’	12”
Carex rupestris, Curly Sedge	A	X	X	X			N	Y	14”	12”
Carex stipata, Sawbeak Sedge	A	X	M/W	X	X	X	N	N	20”	12”
~~*Carex testacea*, New Zealand Orange Sedge~~	~~A~~	~~X~~	~~X~~	~~X~~		~~X~~	~~N~~	~~Y~~	~~24”~~	~~12”~~
Carex tumulicola, Foothill Sedge	A		M/D	X		X	Y	Y	24”	24”
Carex *unilateralis, Lateral Sedge, One-sided Sedge*	A	X	M/W		X		Y	N	24”	24”
Carex vesicaria, Inflated Sedge	A	X	X	X		X	Y	N	36”	12”
~~*Clarkia amoena,* Summer’s Darling, Farewell To Spring~~	~~A/B~~	~~X~~			~~X~~	~~X~~	~~Y~~	~~N~~	~~24”~~	~~12”~~
~~*Clarkia purpurea,* Four Spot, Godetia~~	~~A/B~~	~~X~~			~~X~~	~~X~~	~~Y~~	~~N~~	~~36”~~	~~12”~~
~~*Collomia grandiflora,* Large Leaf Collomia~~	~~A/B~~	~~X~~			~~X~~	~~X~~	~~Y~~	~~N~~	~~36”~~	~~12”~~
Danthonia californica, California Oatgrass	A/B	X		X	X	X	Y	Y	18”	24”
Deschampsia cespitosa, Tufted Hair Grass	A/B	X	M/D	X	X	X	Y	N	36”	12”
~~*Deschampsia elongate,* Slender Hairgrass~~	~~A~~	~~X~~	~~M/D~~	~~X~~		~~X~~	~~Y~~	~~N~~	~~36”~~	~~12”~~
~~*Dichelostemma congestum,* Ookow~~	~~A~~		~~M/D~~				~~Y~~	~~N~~	~~36”~~	~~12”~~
~~*Downingia elegans,* Calico Flower~~	~~A~~	~~X~~					~~Y~~	~~N~~	~~12”~~	~~12”~~
Eleocharis acicularis, Needle Spike Rush	A	X	M/W	X		X	Y	Y	30”	12”
Eleocharis ovata, Ovate Spike Rush	A/W	X	M/W	X	X	X	Y	Y	30”	12”
Eleocharis palustris, Creeping Spike Rush	A/W	X	M/W	X	X	X	Y	Y	30”	12”
Elymus glaucus, Blue Wild Rye	A/B	X	M/D	X	X	X	Y	Y	24”	12”
~~*Elymus trachycaulus,* Slender or Bearded Wheatgrass~~	~~A~~		~~M/D~~				~~Y~~	~~Y~~	~~36”~~	~~12”~~
~~*Epilobium densiflora,* Dense Spike Primrose~~	~~A/B~~	~~X~~			~~X~~	~~X~~	~~Y~~	~~N~~	~~36”~~	~~12”~~

Plant Name		Proposed Facility Type					Characteristics			
		Private and Public except where noted				Public				
Botanic Name, **Common Name**	**Zone**	**Swale/Filter Strips**	**Contained Planter**	**Basin Infil. Planter Rain Garden Dry Pond**	**Wet Ponds C. Wetlands**	**Basins Ponds**	**NW Native**	**Evergreen**	**Potential Height**	**O.C. Spacing**
Eriophyllum lanatum, Oregon Sunshine	A/B	X			X	X	Y	N	18”	12”
Festuca occidentalis, Western Fescue Grass	A	X	M/D	X		X	Y	N	24”	12”
Festuca roemeri var. *roemeri,* Roemer’s Fescue	A/B	X	D	X	X	X	Y	Y	24”	12”
Festuca rubra, Red Fescue - this is a coastal native	B	X	M/D	X		X	Y	Y	24”	12”
Glycera occidentalis, Western Manna Grass	A/B W	X	M/W	X	X	X	Y	Y	18"	12”
Grindelia integrifolia, Gumweed	A/B	X			X	X	Y	Y	30”	12”
~~*Hebe 'Autumn Glory’*, Hebe~~	~~B~~	~~X~~		~~X~~			~~N~~	~~Y~~	~~14”~~	~~12”~~
Hordeum brachyantherum, Meadow Barley	A	X		X		X	Y	N	30”	12”
Iris douglasiana, Douglas Iris - this is a coastal native	B	X		X		X	Y	N	18”	12”
~~*Iris sibirica*, Siberian Iris~~	~~A~~	~~X~~	~~X~~	~~X~~			~~N~~	~~N~~	~~36”~~	~~12”~~
Iris tenax, Oregon Iris	A/B	X	M/D	X	X	X	Y	N	18”	12”
Juncus acuminatus, Tapertip Rush, Sharp Fruited Rush	A	X	M/W		X	X	Y	N	36”	12”
Juncus balticus, Baltic Rush	A	X	X	X		X	Y	N	20”	12”
Juncus effusus var. pacificus, or var. gracilis Soft rush, Lamp Rush, Common or Pacific Rush	A/W	X	M/W	X	X	X	Y	Y	36”	12”
Juncus ensifolius, Dagger-leaf Rush	A/W	X	M/W	X	X	X	Y	N	10”	12”
Juncus oxymeris, Pointed Rush	A/W	X			X	X	Y	Y	24”	12”
Juncus patens, Spreading Rush, Grooved Rush	A/W	X	M/W	X	X	X	Y	Y	36”	12”
Juncus tenuis, Slender Rush	A/W	X	M/W	X	X	X	Y	Y	36”	12”

Plant Name		Proposed Facility Type					Characteristics			
		Private and Public except where noted				Public				
Botanic Name, **Common Name**	**Zone**	**Swale/Filter Strips**	**Contained Planter**	**Basin Infil. Planter Rain Garden Dry Pond**	**Wet Ponds C. Wetlands**	**Basins Ponds**	**NW Native**	**Evergreen**	**Potential Height**	**O.C. Spacing**
Koeleria macrantha, Junegrass	A	X	M/D		X	X	Y	Y	24”	12”
~~*Lemna minor,* Common Lesser Duckweed~~	~~W~~				~~X~~	~~X~~	~~Y~~	~~Y~~	~~3”~~	~~12”~~
~~*Lupinus micranthus,* Small Flowered Lupine~~	~~B~~	~~X~~		~~X~~		~~X~~	~~Y~~	~~N~~	~~18”~~	~~12”~~

Plant Name		Proposed Facility Type					Characteristics			
		Private and Public except where noted				Public				
Botanic Name, Common Name	Zone	Swale/Filter Strips	Contained Planter	Basin Infil. Planter Rain Garden Dry Pond	Wet Ponds C. Wetlands	Basins Ponds	NW Native	Evergreen	Potential Height	O.C. Spacing
Lupinus polyphyllus, Large-leaved Lupine	A/B	X		X	X	X	Y	N	36”	12”
Lupinus rivularis, Riverbank Lupine	A/B	X		X	X	X	Y	N	36”	12”
~~*Madia elegans,* Showy Tarweed~~	~~A/B~~	~~X~~			~~X~~	~~X~~	~~Y~~	~~N~~	~~4’~~	~~12”~~
~~*Myosotis laxa,* Small-flowered Forget-Me-Not~~	~~A/W~~				~~X~~	~~X~~	~~Y~~	~~N~~	~~18”~~	~~12’~~
~~*Plagiobothrys figuratus,* Popcorn Flower~~	~~A~~	~~X~~					~~Y~~	~~N~~	~~12”~~	~~12”~~
~~*Polypodium glycerrhiza,* Licorice Fern~~	~~A~~	~~X~~	~~X~~	~~X~~		~~X~~	~~Y~~	~~Y~~	~~12”~~	~~12”~~
Polystichum munitum, Sword Fern	A/B W	X	X	X	X	X	Y	Y	24’	24”
~~*Potamogeton natans,* Floating-leafed Pondweed~~	~~W~~				~~X~~	~~X~~	~~Y~~	~~Y~~	~~18”~~	~~12”~~
~~*Potentilla gracilis* var. gracilis, Graceful Cinquefoil~~	~~A/B~~	~~X~~			~~X~~	~~X~~	~~Y~~	~~N~~	~~24”~~	~~12”~~
~~*Prunella vulgaris* var. *vulgaris,* Heal All~~	~~A/B~~	~~X~~			~~X~~	~~X~~	~~N~~	~~Y~~	~~18”~~	~~12”~~
~~*Pteridium aquilinum, Bracken Fern~~	~~A/B~~	~~X~~	~~X~~	~~X~~		~~X~~	~~Y~~	~~Y~~	~~5’~~	~~12"~~
~~*Ranunculus occidentalis,* Western Buttercup~~	~~A/B~~	~~X~~			~~X~~	~~X~~	~~Y~~	~~N~~	~~18”~~	~~12”~~
Sagittaria latifolia, Wapato	W				X	X	Y	N	24”	12”
Scriptus acutus, Hardstem Bulrush	A/W	X	M/W	X	X		N	N	10”	12”
Scriptus americanus, American Bulrush, Three Square	A	X	X	X		X	Y	Y	30”	12”
Scriptus mIcrocarpus, Small Fruited Bulrush	AB	X	M/W	X	X	X	Y	Y	24”	12”
Scriptus validus, Softstem Bulrush	A	X	X	X	X		N	N	5’	12”
~~*Sedum oreganum, Oregon Stonecrop~~	~~A/B~~	~~X~~	~~D~~				~~Y~~	~~Y~~	~~4”~~	~~12”~~
Sidalcea campestris, Meadow Sidalcea	B					X	Y	N	5’	12”
~~*Sidalcea nelsoniana, Nelson’s Checkermallow~~	~~B~~					~~X~~	~~Y~~	~~N~~	~~5’~~	~~12”~~
~~*Sisyrinchium californicum,* Yellow-eyed Grass~~	~~A/B~~	~~X~~	~~X~~	~~X~~			~~N~~	~~Y~~	~~6”~~	~~12”~~

Plant Name		Proposed Facility Type					Characteristics			
		Private and Public except where noted				Public				
Botanic Name, Common Name	Zone	Swale/Filter Strips	Contained Planter	Basin Infil. Planter Rain Garden Dry Pond	Wet Ponds C. Wetlands	Basins Ponds	NW Native	Evergreen	Potential Height	O.C. Spacing
Sisyrinchium douglasii, Purple-eyed Grass	A		M				Y	Y	12”	12”
Sisyrinchium idahoense (or *S.angustifolium; S.bellum*), Blue-eyed Grass	A/B	X	M	X	X	X	N	Y	6”	12”
~~*Sparganium emersum,* Narrowleaf Bur-reed~~	~~W~~				~~X~~	~~X~~	~~Y~~	~~N~~	~~24”~~	~~12”~~
~~*Veronica Americana,* American Speedwell, Brooklime~~	~~W~~				~~X~~		~~Y~~	~~N~~	~~6”~~	~~12”~~
~~*Veronica liwanensis, Speedwell*~~	~~A/W~~	~~X~~		~~X~~	~~X~~		~~N~~	~~N~~	~~2”~~	~~12”~~
~~*Viola palustris,* Marsh Violet~~	~~A/W~~				~~X~~	~~X~~	~~Y~~	~~N~~	~~6”~~	~~6”~~
Large Shrubs and Small Trees										
Acer circinatum, Vine Maple	A/B W	X	M/W	X	X	X	Y	N	15’	10’
*Amelanchier alnifolia, Western (*Saskatoon) *Serviceberry*	B	X	D	X	X	X	Y	N	20’	10’
Ceanothus cuneatus, Buckbrush	B	X		X	X	X	Y	Y	12’	10’
Ceanothus integerrimus, Deerbrush	B	X		X	X	X	Y	Y	13’	10’
Ceanothus sanguineus, Oregon Redstem Ceanothus	B	X		X		X	Y	Y	7’	4’
Holodiscus discolor, Oceanspray	B	X		X	X	X	Y	N	6’	4’
Lonicera involucrata, Black Twinberry	B	X		X	X	X	Y	N	5’	4’
Oemleria cerasiformis, Indian Plum, Osoberry	A/B W	X	M/D	X	X	X	Y	N	6’	4’
Philadelphus lewisii, Wild Mock Orange	B	X	M/D	X	X	X	Y	N	6’	4’
Ribes sanguineum, Red-flowering Current	B	X	M/D	X	X	X	Y	N	8’	4’
Rubus parviflorus, Thimbleberry	A/B	X	M/D	X	X	X	Y	N	8’	4’
Rubus spectabilis, Salmonberry	A/W	X	X	X	X	X	Y	N	10’	4’
~~*Salix fluviatalis,* Columbia Willow~~	~~A/B W~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~N~~	~~N~~	~~13’~~	~~6’~~

Plant Name		Proposed Facility Type					Characteristics			
		Private and Public except where noted				Public				
Botanic Name, Common Name	Zone	Swale/Filter Strips	Contained Planter	Basin Infil. Planter Rain Garden Dry Pond	Wet Ponds C. Wetlands	Basins Ponds	NW Native	Evergreen	Potential Height	O.C. Spacing
Salix lucida var. 'Lasiandra', Pacific Willow	A/W	X	X	X	X	X	Y	N	13’	6’
~~*Salix purpurea nana,* Blue Arctic Willow~~	~~B~~	~~X~~		~~X~~			~~N~~	~~N~~	~~8’~~	~~6’~~
~~*Salix sessilifolia,* Soft Leafed Willow~~	~~A~~	~~X~~	~~M/W~~				~~Y~~	~~N~~	~~15’~~	~~6’~~
~~*Salix stichensis, Sitka Willow*~~	~~A/W~~	~~X~~	~~M/W~~	~~X~~	~~X~~	~~X~~	~~Y~~	~~N~~	~~20’~~	~~6’~~
Sambucus cerulea, Blue Elderberry	A/B	X		X	X	X	Y	N	10’	10’
Sambucus racemosa, Red Elderberry	A/B	X		X	X	X	Y	N	10’	10’
Spiraea betulifolia, Birchleaf Spiraea, Shinyleaf	A				X	X	Y	N	24"	24"
Spriaea douglasii, Douglas Spiraea	A/B	X	M/W	X	X	X	Y	N	7’	4’
Viburnum edule, Highbush Cranberry; Squashberry	A/B	X	M	X	X	X	Y	N	6’	4’
Shrubs										
Ceanothus velutinus, Snowbrush	B	X	M/D	X		X	Y	Y	4’	3’
Cornus sericea, Red-twig Dogwood	A/W	X	M/W	X	X	X	Y	N	6’	4’
Cornus sericea 'Kelseyii', Kelsey Dogwood	B	X		X		X	N	N	24”	24”
Gaultheria shallon, Salal	B	X	M/D	X		X	Y	Y	24”	24”
Mahonia (or Berberis) aquifolium, Tall Oregon Grape	A/B	X	M/D	X	X	X	Y	Y	5’	3’
Mahonia nervosa, Dull Oregon Grape	A/B	X	M/D	X	X	X	Y	Y	24”	24”
Physocarpus capitatus, Pacific Ninebark	A/B W	X	M/W	X	X	X	Y	N	10’	3’
~~*Rosa gymnocarpa,* Baldhip Rose~~	~~B/W~~	~~X~~	~~M/D~~	~~X~~	~~X~~	~~X~~	~~Y~~	~~N~~	~~3’~~	~~3’~~
~~*Rosa nutkana*, Nootka Rose~~	~~A/B~~	~~X~~	~~M/D~~	~~X~~	~~X~~	~~X~~	~~Y~~	~~N~~	~~8’~~	~~3’~~
~~*Rosa pisocarpa*, Swamp Rose~~	~~A/B W~~	~~X~~	~~M/D~~	~~X~~	~~X~~	~~X~~	~~Y~~	~~N~~	~~8’~~	~~3’~~
Symphoricarpos alba, Common Snowberry	A/B	X	M/D	X	X	X	Y	N	6’	3’

Plant Name		Proposed Facility Type					Characteristics			
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Botanic Name, Common Name	Zone	Swale/Filter Strips	Contained Planter	Basin Infil. Planter Rain Garden Dry Pond	Wet Ponds C. Wetlands	Basins Ponds	NW Native	Evergreen	Potential Height	O.C. Spacing
Groundcover										
Arctostaphylos uva-uris, Kinnickinnick	B	X		X	X	X	Y	Y	6”	12”
Fragaria chiloensis, Coastal Strawberry	B	X		X		X	Y	Y	6”	12”
Fragaria vesca, Woodland Strawberry	A/B	X		X	X	X	N	Y	10”	12”
Fragaria virginiana, Wild Strawberry	A/B	X		X	X	X	N	Y	10”	12”
~~*Helictotrichon sempervirens,* Blue Oat Grass~~	~~B~~	~~X~~		~~X~~			~~N~~	~~Y~~	~~24”~~	~~12”~~
Mahonia repens Creeping Oregon Grape – *not a Lane County native*	B	X		X			Y	Y	12”	12”
Trees										
~~Abies grandis, Grand Fir~~	~~A/B~~	~~X~~		~~X~~	~~X~~	~~X~~	~~Y~~	~~Y~~	~~150’~~	
Acer griseum, Paperbark Maple	A/B	X		X	X		N	N	30’	
~~*Acer macrophyllum,* Big Leaf Maple~~	~~B~~	~~X~~		~~X~~	~~X~~	~~X~~	~~Y~~	~~Y~~	~~60’~~	
Alnus rhombifolia, White Alder	A	X		X	X	X	Y	N	80’	
Alnus rubra, Red Alder	A/W	X		X	X	X	Y	N	80’	
Arbutus menziesii, Madrone	B	X		X	X	X	Y	N	35’	
~~*Betula papyrifera, var. papyrifera,* Paperbark Birch – *Eastern OR. Native*~~	~~B~~					~~X~~	~~N~~	~~N~~	~~60’~~	
~~*Calocedrus decurrens,* Incense Cedar~~	~~B~~	~~X~~		~~X~~	~~X~~	~~X~~	~~Y~~	~~Y~~	~~150’~~	
~~*Castanopsis chrysopylla* Chinquapin, Giant, Golden~~	~~B~~			~~X~~	~~X~~	~~X~~	~~Y~~	~~Y~~	~~90’~~	
Celtis reticulata, Netleaf Hackberry- *Eastern OR. Native*	B			X		X	N	N	20’	
Cornus nuttallii, Western Flowering Dogwood	A/B	X		X	X	X	Y	N	20’	
Corylus cornuta, Western Beaked Hazelnut	B	X		X	X	X	N	N	40’	
~~*Corylus cornuta,* California Hazelnut~~	~~B~~	~~X~~		~~X~~	~~X~~	~~X~~	~~Y~~	~~N~~	~~40’~~	

Plant Name		Proposed Facility Type					Characteristics			
		Private and Public except where noted				Public				
***Botanic Name,* Common Name**	**Zone**	**Swale/Filter Strips**	**Contained Planter**	**Basin Infil. Planter Rain Garden Dry Pond**	**Wet Ponds C. Wetlands**	**Basins Ponds**	**NW Native**	**Evergreen**	**Potential Height**	**O.C. Spacing**
Crataegus douglasii (or *C. suksdorfii*), Black Hawthorn	A/W	X	M/W	X	X	X	Y	N	40'	10’
~~*Fraxinus latifolia*, Oregon Ash~~	~~A/B W~~	~~X~~		~~X~~	~~X~~	~~X~~	~~Y~~	~~N~~	~~30’~~	
Malus fusca, Pacific Crabapple	A/W	X	M/W	X	X	X	Y	N	30’	10’
~~*Metasequoia glyptostroboides*, Dawn Redwood~~	~~B~~			~~X~~		~~X~~	~~N~~	~~N~~	~~80’~~	
~~*Pinus monticola,* Western White Pine~~	~~A/B~~	~~X~~		~~X~~	~~X~~	~~X~~	~~Y~~	~~Y~~	~~90’~~	
~~*Pinus ponderosa*, Ponderosa Pine~~	~~B~~	~~X~~		~~X~~	~~X~~	~~X~~	~~Y~~	~~Y~~	~~70’~~	
~~*Populus balsamifera*, Black Cottonwood~~	~~A/B~~	~~X~~		~~X~~	~~X~~	~~X~~	~~Y~~	~~N~~	~~100’~~	
~~*Populus tremuloides,* Quaking Aspen~~	~~A~~			~~X~~		~~X~~	~~Y~~	~~N~~	~~40’~~	
~~*Prunus emarginata var. mollis,* or *P. virginiana*), Bitter or Choke Cherry~~	~~A/B W~~	~~X~~	~~M~~	~~X~~	~~X~~	~~X~~	~~Y~~	~~N~~	~~50’~~	
~~*Pseudotsuga menziesii,* Douglas Fir~~	~~A/B~~	~~X~~		~~X~~	~~X~~	~~X~~	~~Y~~	~~Y~~	~~200’~~	
Quercus garryana, Oregon White Oak	B	X		X	X	X	Y	N	100’	
Quercus kelloggii, California Black Oak	B	X		X	X	X	Y	N	100’	
Rhamnus purshiana, Cascara	A/B W	X	W/D	X	X	X	Y	N	30’	
~~*Salix hookeriana,* Hooker's Willow, Piper’s Willow~~	~~A/B W~~	~~X~~	~~M/W~~	~~X~~	~~X~~	~~X~~	~~Y~~	~~N~~	~~15’~~	
~~*Salix scouleriana,* Scouler's Willow~~	~~A/B W~~	~~X~~	~~M/W~~	~~X~~	~~X~~	~~X~~	~~Y~~	~~N~~	~~15'~~	
~~*Sequoia sempervirons,* Coast Redwood~~	~~A~~				~~X~~		~~Y~~	~~Y~~	~~150’~~	
~~*Thuja plicata*, Western Red Cedar~~	~~A/W~~	~~X~~		~~X~~	~~X~~	~~X~~	~~Y~~	~~Y~~	~~150’~~	
~~*Tsuga hetrophylla,* Western Hemlock~~	~~A~~	~~X~~		~~X~~		~~X~~	~~Y~~	~~Y~~	~~125’~~	
~~*Tsuga mertensiana*, Mountain Hemlock~~	~~B~~	~~X~~		~~X~~		~~X~~	~~Y~~	~~Y~~	~~125’~~	

COMMENTARY: The Ecoroof Plant List and the Green Street Plant List were removed because they are not used often and were from Portland's old Stormwater Management Manual.

The Parking Lot Trees Reference List was removed because it is redundant with the street tree appendix.

The Seed Specification section was removed because it is not used often and is from Portland's old Stormwater Management Manual.

Ecoroof Plant List

Note: Alternative plants not found on this list may be allowed with approval from City staff.

Plant Name		Characteristics					
Botanic Name, Common Name	Zone	NW Native	Evergreen	Potential Hgt.	O.C. Spacing	Full Sun	Partial Shade
Sedums and Succulents							
Delosperma cooper, Ice Plant *Delosperma nubegenum*, Ice Plant	C	N	Y	4”		X	
Malephora crocea var. purpureo crocea 'Tequila Sunrise', Coppery Mesemb	C	N	Y	10”		X	
**Sedum telephium* varieties including 'Autumn Joy' and 'Variegatum' Stonecrop	C	N	N	24”		X	
Sedum acre, Biting Stonecrop	C	N	Y	2”		X	
**Sedum album*, White Stonecrop	C	N	Y	3”		X	
Sedum divergens, Pacific Stonecrop	C	N	Y	3”		X	
Sedum hispanicum, Spanish Stonecrop	C	N	Y	3”		X	
Sedum kamtschaticum, Kirinso	C	N	N	6”		X	
**Sedum oreganum*, Oregon Stonecrop	C	Y	Y	4”		X	X
Sedum sexangular, Tasteless Stonecrop	C	N	Y	4”		X	
**Sedum spathulifolium*, Stonecrop	C	Y	Y	4”		X	
**Sedum spurium* varieties, Stonecrop	C	N	Y	6”		X	X
**Sempervivum tectorum*, Hens and Chicks	C	N	Y	6”		X	
Herbaceous Plants							
Achillea ageratifolia, Greek Yarrow	C	N	N	36”		X	
Achillea millefolium, Common Yarrow	C	N	N	36”		X	
Achillea tomentosa, Wooly Yarrow	C	N	N	8”		X	
Allium acuminatum, Hooker’s Onion	C	Y	N	20”		X	X
Allium amplectens, Slim Leaf Onion	C	Y	N	20”		X	X
Arenaria montana, Sandwort	C	N	N	4”		X	
Artemesia 'Silver Mound', Artemesia	C	N	N	12”		X	
Aurinia saxatilis, 'Compacta', Alyssum Saxatile	C	N	N	6”		X	
Brodiaea congesta, Harvest Brodiaea	C	Y	N	20”		X	X
Castilleja foliosa, Indian Paintbrush	C	Y	N	10”		X	
**Cerastium tomentosum*, Snow-in-Summer	C	N	Y	8”		X	X
Clarkia amoena, Summer’s Darling	C	Y	N	30”		X	
Clarkia purpurea, Four Spot, Godetia	C	Y	N	30”		X	
Dianthus alwoodii, Pink *Dianthus deltoids*, Maiden Pink	C	N	N	12”		X	X
Dichelostemma congestum, Ookow	C	Y	N	20”		X	
Erigeron discoideus, Fleabane	C	N	N	12”		X	X
Festuca glauca, Blue Fescue	C	N	Y	12”		X	X
Fragaria chiloensis, Coastal Strawberry	C	Y	Y	10”		X	X
Fragaria virginiana, Wild Strawberry	C	Y	Y	10”		X	X
Fragaria vesca, Woodland Strawberry	C	Y	Y	10”		X	X

Plant Name		Characteristics					
Botanic Name, Common Name	Zone	NW Native	Evergreen	Potential Hgt.	O.C. Spacing	Full Sun	Partial Shade
Gaillardia aristata, Birds-eye gilia	C	N	N	20”		X	X
Gazania linearis var. 'Colorado Gold' , Gazania	C	N	N	6”		X	
**Gilia capitata*, Blue Thimble Flower	C	Y	N	12”		X	
Koelaria macrantha, June Grass	C	N	N	24”		X	X
Linaria reticulate, Purplenet Toadflax	C	N	N	20”		X	
Lobularia maritima, Sweet Alyssum	C	N	N	12”		X	
Nierembergia repens, Cup Flower	C	N	Y	6”		X	X
**Polypodium glycerrhiza,* Licorice Fern	C	Y	Y	12”		X	X
**Polystichum munitum,* Sword Fern	C	Y	Y	24”		X	X
Potentilla nepalensis, Nepal Cinquefoil	C	N	N	14”		X	X
Potentilla neumanniana, Cinquefoil	C	N	N	14”		X	
Thymus serphyllum, Creeping Thyme, Mother of Thyme	C	N	N	3”		X	
Thymus vulgaris, Common Thyme	D	N	Y	12”		X	X
Veronica liwanensis, Speedwell	C	N	N	2”		X	X
Shrubs							
Amalanchier alnifolia, Saskatoon Serviceberry	D	Y	N	20’		X	
Berberis thunbergii, Japanese Barberry	D	N	N	4’		X	
Gaultheria shallon, Salal	D	Y	Y	24”		X	X
Lavandula angustifolia 'Hidcote', Dwarf English Lavander	D	N	Y	30”		X	
Mahonia aquifolium, Oregon Grape	D	Y	Y	5’		X	X
Mahonia nervosa, Dull Oregon Grape	D	Y	Y	24”		X	X
Mahonia repens, Creeping Oregon Grape	D	Y	Y	12”		X	X
Nanadina domestica, Heavenly Bamboo	D	N	N	4'		X	X
Ribes sanguineum, Red-Flowering Current	D	Y	N	12’		X	X
Rosa nutkana, Nootka Rose	D	Y	N	10’		X	
Symphoricarpos mollis, Creeping Snowberry	D	Y	N	18”		X	X

* Indicates that Portland’s Bureau of Environmental Services has observed these plants generally survive in ecoroof areas that do not receive summer irrigation. Most of these locations have moderate to deep shade. To date, these plants appear very stressed by the end of summer, but they have come back each year. It is likely that many of the other plants listed above could survive in such conditions without irrigation.

Greenstreet Plant List

Note: Alternative plants not found on this list may be allowed with approval from City staff.

Plant Name		Facility Type			Characteristics				
Botanic Name, Common Name	Zone	Swale	Curb Extension	Planter	NW Native	Evergreen	Potential Height	O.C. Spacing	Under Powerlines
Herbaceous Plants									
Camassia leichtlini, Great Camas	A/B	X	X	X	Y	N	24”	12”	
Camassia quamash, Common Camas	A/B	X	X	X	Y	N	24”	12”	
Carex comans, New Zealand Hair Sedge	A	X	X	X		Y	18”	12”	
Carex densa , Dense Sedge	A	X	X	X	Y	Y	24”	12”	
Carex obnupta, Slough Sedge	A	X	X	X	Y	Y	4’	12”	
Carex stipata, Sawbeak Sedge	A	X	X	X	N	N	20”	12”	
Carex testacea, New Zealand Orange Sedge	A	X	X	X	N	Y	24”	12”	
Deschampsia cespitosa , Tufted Hair Grass	A/B	X	X	X	Y	N	36”	12”	
Iris douglasiana, Douglas Iris	B	X	X		Y	N	18”	12”	
Iris tenax, Oregon Iris	B	X	X		Y	N	18”	12”	
Juncus patens, Spreading Rush	A	X	X	X	N	Y	36”	12”	
Polystichum munitum, Sword Fern	A/B	X	X		Y	Y	24”	24”	
Shrubs									
Cornus sericea ‘Kelseyii’, Kelsey Dogwood	A/B	X	X	X	N	N	24”	24”	
Euonymous japonicus 'Microphyllus' Boxleaf Evergreen Euonymus	B	X	X		N	Y	24”	24”	
Gaultheria shallon, Salal	B	X	X		Y	Y	24”	24”	
Lavandula angustifolia 'Hidcote Blue', Dwarf Lavander	B	X	X		N	N	24”	24”	
Mahonia nervosa, Dull Oregon Grape	B	X	X		Y	Y	24”	24”	
Spirarea betulifolia, Birchleaf Spiraea	A/B	X	X	X	Y	N	24”	24”	
Spiraea densiflora, Subalpine Spiraea	A/B	X	X	X	Y	N	24’	24”	
Rosmarinus officinalis 'Huntington Blue Carpet', Creeping Rosemary	B	X	X		N	N	12”	24”	
Viburnum opulus 'Nanum', Dwarf European Cranberry	B	X	X		N	N	24’	24”	
Groundcovers									
Arctostapylos uva-ursi, Kinnickinnick	B	X	X		Y	Y	6”	12”	
Fragaria chiloensis, Coastal	B	X	X		Y	Y	6”	12’	

Plant Name		Facility Type			Characteristics				
Botanic Name, Common Name	Zone	Swale	Curb Extension	Planter	NW Native	Evergreen	Potential Height	O.C. Spacing	Under Powerlines
Strawberry									

Plant Name		Facility Type			Characteristics				
Botanic Name, Common Name	Zone	Swale	Curb Extension	Planter	NW Native	Evergreen	Potential Height	O.C. Spacing	Under Powerlines
Fragaria vesca, Woodland Strawberry	B	X	X		Y	Y	6'	12'	
Fragaria virginiana, Wild Strawberry	B	X	X		N	Y	10'	12'	
Helictotrichon sempervirens, Blue Oat Grass	B	X	X		N	Y	24'	12'	
Mahonia repens, Creeping Oregon Grape	B	X	X		Y	Y	12'	12'	
Street Trees - Greenstreet									
Acer campestre 'Evelyn' Queen Elizabeth Hedge Maple	A/B	X	X	X	N	N	30'		N
Acer platanoides, Norway Maple	A/B	X	X	X	N	N	60'		N
Acer pseudoplatanus, Sycamore Maple	A/B	X	X	X	N	N	60'		N
Acer rubrum, Red Maple	A/B	X	X	X	N	N	60'		N
Betula jacquemontii, Jacquemontii Birch	A/B	X	X	X	N	N	60'		N
Carpinus caroliniana, American Hornbeam	A/B	X	X	X	N	N	30'		N
Catalpa speciosa, Western Catalpa	A/B	X	X		N	N	50'		N
Celtis occidentalis, Hackberry	A/B	X	X	X	N	N	50'		N
Cornus nuttallii, Western Flowering Dogwood	A/B	X	X		Y	N	20'		N
Fraxinus Americana, White Ash	A/B W	X	X	X	N	N	25'		N
Fraxinus latifolia, Oregon Ash	A/B W	X	X		Y	N	30'		N
Fraxinus pennsylvanica 'Johnson', Leprechaun, Green Ash	A/B	X	X	X	N	N	30'		N
Ginkgo biloba, Ginkgo	A/B	X			N	N	80'		N
Gleditsia triacanthos 'Impcole', Imperial Honeylocust	A/B	X	X	X	N	N	30'		N
Gleditsia triacanthos 'Skycole', Skyline Honeylocust	A/B	X	X	X	N	N	70'		N
Koelreuteria paniculata, Goldenrain Tree	A/B	X	X	X	N	N	30'		N
Liquidambar styraciflua, Sweet Gum	A/B	X	X	X	N	N	70'		N
Nyssa sylvatica, Black Tupelo, Blackgum	A	X	X	X	N	N	50'		N
Prunus virginiana 'Canada Red', Canada Red Chokecherry	A/B	X	X	X	N	N	25'		N
Quercus bicolor, Swamp White Oak	A/B	X	X	X	N	N	70'		N
Quercus macrocarpa, Bur Oak	A/B	X	X	X	N	N	70'		N

Plant Name		Facility Type			Characteristics				
Botanic Name, Common Name	Zone	Swale	Curb Extension	Planter	NW Native	Evergreen	Potential Height	O.C. Spacing	Under Powerlines
Quercus phellos, Willow Oak	A/B	X	X	X	N	N	50'		N
Quercus robur, English Oak	A/B	X	X	X	N	N	70'		N
Quercus rubra, Northern Red Oak	A/B	X	X	X	N	N	75'		N
Quercus shumardii, Shumard Oak	A/B	X	X	X	N	N	70'		N
Rhamnus purshiana, Cascara	A/B	X	X	X	Y	N	30'		N
Sophora japonica, Scholartree	A/B	X			N	N	60'		N
Tilla cordata, Littleleaf Linden	A/B	X	X	X	N	N	60'		N
Tilia platyphyllos, Bigleaf Linden	A/B	X	X	X	N	N	70'		N
Ulmus accolade, Accolade Elm	A/B	X	X	X	N	N	70'		N
Umbellularia californica, Oregon Myrtle	A/B	X	X	X	Y	Y	75'		N

Parking Lot Trees (Reference List)

The City of Springfield has included the parking lot tree list **to assist designers in selecting trees most appropriate** for the potentially numerous micro-climates that might exist in parking lots and in proximity to building walls. It is likely that most parking lots will be hot in summer months until the trees become established. The City has attempted to point out native species in the list and provide their suitability to various conditions.

The recommended minimum clearance from the pavement provides guidance on the amount of planting space each tree needs. It is expressed as the distance from the center of the planted tree trunk to the nearest paved surface. Comments provide guidance as to best applications of the different trees and additional information that may help in tree selection. For example, some trees are well suited to landscaped areas that will receive stormwater runoff, while others may not tolerate the additional moisture from runoff, largely depending on the soil.

There are two tables. The first consists of native trees and the second consists of trees that are not native to the Springfield area.

Native Parking Lot Trees

Scientific Name	Common Name	Min. Distance from Pavement	Comments
Abies grandis	Grand Fir	4 feet	Conifer, evergreen. Can grow very tall.
Acer macrophyllum	Big Leaf Maple	4 feet	Broadleaf, deciduous.
Alnus rhombifolia	White Alder	3 feet	Broadleaf, deciduous. Moisture loving. *Short lived species.*

Alnus rubra	Red Alder	3 feet	Broadleaf, deciduous. Moisture loving. *Short lived species.*
Calocedrus decurrens	Incense Cedar	4 feet	Conifer, evergreen. Prefers moist conditions and some shade.
Crataegus douglasii, var. douglasii	Black Hawthorn, wetland form	3 feet	Broadleaf, deciduous. A smaller tree. Wetland form tolerates wet areas.
Fraxinus latifolia	Oregon Ash	3 feet	Broadleaf, deciduous. Tolerates wet conditions.
Pinus ponderosa, ssp. Valley	Ponderosa Pine, Valley subspecies	4 feet	Conifer, evergreen. Prefers drier conditions, but Valley subspecies is adapted to Willamette Valley climate.
Pseudotsuga menziesii	Douglas Fir	4 feet	Conifer, evergreen. Can grow very tall.
Quercus garryana	Oregon White Oak	4 feet	Broadleaf, deciduous. Drought tolerant.
Quercus kelloggii	California Black Oak	4 feet	Broadleaf, deciduous. Drought tolerant.
Rhamnus purshiana	Cascara	3 feet	Broadleaf, deciduous. A smaller tree.
Thuja plicata	Western Red Cedar	4 feet	Conifer, evergreen. Prefers moist conditions and some shade. *Does not do well in direct sunlight; shade tolerant.*
Thuja plicata var. *hogan* *Native to Gresham OR. area*	Western Red Cedar 'Hogan'	4 feet	Conifer, evergreen. Prefers moist conditions and some shade. 'Hogan' is a narrow-growing variety.

Non-Native Parking Lot Trees

Scientific Name	**Common Name**	**Min. Distance from Pavement**	**Comments**
Abies amabilis	Silver Fir	4 feet	Conifer, evergreen. Native to Oregon Cascades.
Acer campestre	Hedge Maple; 'Queen Elisabeth'	2 feet	Broadleaf, deciduous.
Acer rubrum	Red Maple 'Embers Red,' 'October Glory,' 'Red Sunset,' 'Gerling,' 'Autumn Flame'	3 feet	Broadleaf, deciduous. Good for stormwater facilities
Acer saccharum	Sugar Maple; 'Bonfire' (except 'Legacy')	3 feet	Broadleaf, deciduous.
Calocedrus decurrens	Incense Cedar	3 feet	Conifer, evergreen. Drought tolerant

Scientific Name	Common Name	Min. Distance from Pavement	Comments
Carpinus betulus	European Hornbeam	2 feet	Broadleaf, deciduous. Shade tolerant.
Celtis occidentalis	Hackberry; 'Common', Prairie Pride'	3 feet	Broadleaf, deciduous.
Cercidiphyllum japonicum	Katsura Tree	3 feet	Broadleaf, deciduous. Prefers well-drained soils. Needs summer irrigation
Cladrastis kentuckea	Yellowwood	3 feet	Broadleaf, deciduous. Prefers summer irrigation and well-drained soil.
Cornus kousa var. *chinensis*	Chinese Dogwood	3 feet	Broadleaf, deciduous. Small tree. Fruits, but is not messy. Needs summer water.
Crataegus x lavallei	Lavalle Hawthorn	2 feet	Broadleaf, deciduous. Fruit can be messy.
Fagus grandifolia	American Beech	4 feet	Broadleaf, deciduous.
Fagus sylvatica	European Beech	4 feet	Broadleaf, deciduous.
Fagus sylvatica var.	European Beech 'Roseo-marginata,' 'Tricolor'	3 feet	Broadleaf, deciduous.
Fraxinus americana	White Ash; 'Rosehill'	3 feet	Broadleaf, deciduous. Needs plenty of water until established.
Fraxinus excelsior	European Ash	3 feet	Broadleaf, deciduous. Needs plenty of water until established.
Fraxinus pennsylvanica	Green Ash 'Marshall,' 'Patmore,' 'Summit,' 'Urbanite'	3 feet	Broadleaf, deciduous. .Needs plenty of water until established.
Ginkgo biloba	Ginkgo 'Shangri-la,' 'Saratoga', Maidenhair	3 feet	Measured as a broadleaf; deciduous. *Use the Male only. Female produces messy, smelly fruit.*
Liquidambar styraciflua	Sweetgum	4 feet	Broadleaf, deciduous.
Liriodendron tulipifera	Tulip Tree or Tulip Poplar	4 feet	Broadleaf, deciduous.
Magnolia grandiflora	Southern Magnolia, Bull Bay	4 feet	Broadleaf, evergreen.
Magnolia kobus	Kobus Magnolia	2 feet	Broadleaf, deciduous.
Metasequoia glyptostroboides	Dawn Redwood	4 feet	Conifer, deciduous.
Nothofagus dombeyi	South American Beech or Southern Beech	3 feet	Broadleaf, evergreen.

Scientific Name	Common Name	Min. Distance from Pavement	Comments
Nothofagus obliqua	Roble Beech	3 feet	Broadleaf, deciduous.
Nyssa sylvatica	Black Gum or Black Tupelo, Sour Gum, Pepperidge	3 feet	Broadleaf, deciduous. Good for stormwater facilities.
Ostrya virginiana	American Hornbeam, Eastern Hornbeam, Ironwood	2 feet	Broadleaf, deciduous.
Pinus contorta	Shore Pine	3 feet	Conifer, evergreen. A smaller tree.
Pinus monticola	Western White Pine	3 feet	Conifer, evergreen.
Quercus bicolor	Swamp White Oak	3 feet	Broadleaf, deciduous. Tolerates wet soil.
Quercus coccinea	Scarlet Oak	3 feet	Broadleaf, deciduous. Intolerant of wet soil.
Quercus frainetto	Hungarian Oak 'Forest Green'	3 feet	Broadleaf, deciduous.
Quercus nigra	Water Oak, Possum Oak, Spotted Oak	3 feet	Broadleaf, evergreen. Tolerates wet conditions.
Quercus phellos	Willow Oak	3 feet	Broadleaf, deciduous.
Quercus robur	English Oak	3 feet	Broadleaf, deciduous.
Quercus rubra	Northern Red Oak	4 feet	Broadleaf, deciduous.
Quercus velutina	Black Oak, Yellow Oak	4 feet	Broadleaf, deciduous.
Sequoia sempervirens	Coast Redwood	6 feet	Conifer, evergreen. Grows very tall.
Sequoiadendron giganteum	Giant Sequoia	8 feet	Conifer, evergreen. Trunk quickly becomes massive; needs ample space.
Sophora japonica	Japanese Pagoda Tree	3 feet	Broadleaf, deciduous.
Taxodium distichum	Bald Cypress	4 feet	Conifer, deciduous. Tolerates extremely wet conditions, but does not require it.
Umbellularia californica	California Laurel, Oregon Myrtle, Bay	4 feet	Broadleaf, evergreen. Drought tolerant.
Zelkova serrata	Sawleaf Zelkova 'Green Vase', Halka', 'Village Green'	3 feet	Broadleaf, deciduous.

Resources:
United States Department of Agriculture Plants Database:
http://plants.usda.gov/java/

Wildflowers of the Pacific Northwest:
http://www.pnwflowers.com/flower/collomia-grandiflora

The Oregon Flora Project:
http://www.oregonflora.org/index.php

SEED SPECIFICATION

Species listed below should only be used in the listed moisture regime for optimal success. Sow rates for **small seeded mixes** shall contain a **minimum of 20 lbs/per acre in combination** for stormwater management facilities and **30 lbs/acre for erosion control** purposes. **Sow rates for large/medium seeded** mixes should contain a **minimum of 25 lbs per acre** in combination for stormwater management facilities and 40 lbs per acre **for erosion control** purposes.

Xeric: of, relating to, or growing in dry conditions

Mesic: of, relating to, or growing in conditions of medium water supply

Grasses

Common Name	Scientific Name	Optimal Sow Season	Matrix or to Add Diversity	Swale or Pond Sow Rate (Hand)	Erosion Control Sow Rate	Moisture	Exposure	Seed Size	Commercial Accessibility of Local Eco-type
American Slough Grass	Beckmannia syzigachne	Fall/Spring	D	2 lbs/ac	NR	Inundated to wet	Sun	Medium	Easy to medium, Willamette Valley
Blue Wildrye	Elmus glaucus	Early Fall/Spring	M	25lbs/ac	40lbs/acre	Xeric to mesic	Sun to shade	Large	Easy, Portland Metro
California Brome	Bromus carinatus	Early Fall/Spring	M	25lbs/ac	40lbs/acre	Xeric to mesic	Sun	Large	Easy, Portland Metro
California Oatgrass	Danthonia californica	Fall/spring	M	30lbs/ac	NR		Sun	Large	Easy to medium, Willamette Valley
Columbia Brome	Bromus yulgaris	Fall/Spring	D	5 lbs/ac	NR	Xeric to mesic	Shade	Large	Medium, Portland Metro
Junegrass	Koeleria macrantha	Fall/Spring	M	20lbs/ac	NR	Xeric to mesic	Sun	Small	Easy to medium, PDX or Willamette Valley
Meadow Barley	Hordeum brachyantherum	Early Fall/Spring	M	25lbs/ac	40lbs/acre	Wet to mesic	Sun	Large	Easy to medium, Willamette Valley
Rice Cutgrass	Leersie oryziodes	Fall/Spring	D	5 lbs/ac	NR	Inundated to wet	Sun	Medium	Medium to difficult, Portland Metro
Roemer's Fescue	Festuca roemeri	Fall/Spring	D	2 lbs/ac	NR	Xeric to mesic	Sun	Small	Difficult, Willamette Valley
Sitka Brome	Bromus sitchensis	Early Fall/Spring	M	25lbs/ac	40lbs/acre	Wet to mesic	Sun/Shade	Large	Easy, Willamette Valley
Slender Hairgrass	Deschampsia elongata	Early Fall/Spring	M	20lbs/ac	30lbs/acre	Wet to xenic	Sun	Small	Easy, Portland Metro
Slender Wheatgrass	Elynmus trachycaulus	Early Fall/Spring	M	25lbs/ac	40lbs/acre	Xenic to mesic	Sun	Large	Medium to difficult, Willamette Valley
Spike Bentgrass	Agrostis exarata	Early Fall/Spring	D	5 lbs/ac	30lbs/acre	Saturated to wet	Sun	Small	Easy to medium, Portland Metro

Common Name	Scientific Name	Optimal Sow Season	Matrix or to Add Diversity	Swale or Pond Sow Rate (Hand)	Erosion Control Sow Rate	Moisture	Exposure	Seed Size	Commercial Accessibility of Local Eco-type
Tall Mannagrass	Glyceria elata	Fall/Spring	D	2 lbs/ac	NR	Saturated to mesic	Shade	Small	Medium to difficult, Portland Metro
Tufted Hairgrass	Deschampsia cespitisa	Fall/Spring	D	2 lbs/ac	NR	Saturated to wet	Sun	Small	Easy, Willamette Valley
Water Foxtail	Alopecuris geniculatus	Fall/Spring	M	25lbs/ac	NR	Inundated to wet	Sun	Medium	Easy, PDX or Willamette Valley
Western Fescue	Festuca occidentalis	Fall/Spring	M	20lbs/ac	NR	Xeric to mesic	Sun	Small	Medium to difficult, Willamette Valley
Western Mannagrass	Glyceria occidentalis	Fall/Spring	M	25lbs/ac	NR	Saturated to wet	Sun	Medium	Easy to Medium, Willamette Valley

Sedges, Rushes - soil moisture as indicated into summer months

Scientific Name	Common Name	Optimal Sow Season	Matrix or to Add Diversity	Swale or Pond Sow Rate (Hand)	Erosion Control Sow Rate	Moisture	Exposure	Seed Size	Commercial Accessibility of Local Eco-type
Carex obnupta	Slough Sedge	Fall/Spring	D	2lbs/ac	NR	Inundated to mesic	Sun/Shade	Medium	Medium to difficult, PDX
Carex scoparia	Pointed Broom Sedge	Fall/Spring	D	2lbs/ac	NR	Wet to mesic	Sun	Medium	Medium to difficult, PDX
Carex stipata	Sawbeak Sedge	Fall/Spring	D	2lbs/ac	NR	Inundated to mesic	Sun	Medium	Medium. Willamette Valley
Eleoctaris ovata	Ovate Spikerush	Fall/Spring	D	1lb/ac	NR	Inundated to wet	Sun	Small	Easy, PDX or Willamette Valley
Eleoctaris palustris	Creeping Spikerush	Fall/Spring	D	2lbs/ac	NR	Inundated to wet	Sun	Small	Easy to medium, Willamette Valley
Juncous acuminatus	Tapertio Rush	Fall/Spring	D	.25lbs/ac	NR	Inundated to wet	Sun	Small	Medium, Willamette Valley, PDX
Juncous bufonius	Toad Rush	Fall/Spring	D	.25lbs/ac	NR	Wet to mesic	Sun	Small	Medium, Willamette Valley
Juncous patens	Spreading Rush	Fall/Spring	D	.50lbs/ac	NR	Wet to mesic	Sun/Shade	Small	Easy, PDX

Forbs

Scientific Name	Common Name	Optimal Sow Season	Matrix or to Add Diversity	Swale or Pond Sow Rate (Hand)	Erosion Control Sow Rate	Moisture	Exposure	Seed Size	Commercial Accessibility of Local Eco-type
Achillea millefolium	Western Yarrow	Fall	D	.25lbs/ac	NR	Wet to mesic	Sun	Medium	Easy, PDX or Willamette Valley
Aquilegia formosa	Western Columbine	Fall	D	1.0 lb/ac	NR	Wet to mesic	Sun	Medium	Easy to medium, Willamette Valley
Alisma media	Water Plantain	Fall/Spring	D	1.0 lb/ac	NR	Inundated to wet	Sun	Medium	Easy to medium, Willamette Valley
Collomia frandiflora	Large Flowerd Collomia	Fall/Spring	D	.50 lb/ac	NR	Xeric to mesic	Sun	Small	Medium to difficult, Willamette Valley
Collinsia rattanii	Blue-eyed Mary	Fall/Spring	D	.25lbs/ac	NR	Xeric to mesic	Sun	Small	Medium to difficult, Willamette Valley
Epilobium densiflora	Dense Spike Primrose	Fall	D	1.0 lb/ac	NR	Wet to mesic	Sun	Small	Medium, Willamette Valley
Eriophyllum lanatum	Wooly "Oregon" Sunshine	Fall	D	1.0 lb/ac	NR	Wet to mesic	Sun	Medium	Easy to medium, Willamette Valley
Gilia capitata	Blue Giia	Fall/Spring	D	2lbs/acre	1 lb/ac	Xeric to mesic	Sun	Medium	Medium, Willamette Valley
Lotus purshianus	Spanish Clover	Fall	D	2lbs/acre	1lbac	Xeric to mesic	Sun	Medium	Medium, Willamette Valley
Lupinus albicaulis	Sickle Keel Lupine	Fall	D	1lb/ac	1lb/ac	Xeric to mesic	Sun	Large	Medium, Willamette Valley
Iris tenax	Oregon Iris	Fall	D	2lbs/ac	NR	Xeric to mesic	Sun	Large	Easy to medium, Willamette Valley
Camassia quamash	Common Camas	Fall	D	1lb/ac	NR	Wet to mesic	Sun	Medium	Easy to medium, Willamette Valley
Camassia leichtlinii	Great "Large" Camas	Fall	D	1lb/ac	NR	Wet to mesic	Sun	Medium	Easy to medium, Willamette Valley
Lupinas micranthus	Small Flowered Lupine	Fall	D	1lb/ac	NR	Xeric to mesic	Sun	Medium	Medium to difficult, Willamette Valley
Ranunculus occidental	Western Buttercup	Fall	D	1lb/ac	NR	Xeric to mesic	Sun	Medium	Medium to difficult, Willamette Valley
Sidalcea camp pestris	Checker Mallow	Fall	D	1lb.ac	NR	Xenic to mesic	Sun	Large	Medium to difficult, Willamette Valley
Lupinus rivularis	Stream Lupine	Fall	D	1lb/ac	1lb/ac	Xeric to mesic	Sun	Large	Medium, Willamette Valley

Scientific Name	Common Name	Optimal Sow Season	Matrix or to Add Diversity	Swale or Pond Sow Rate (Hand)	Erosion Control Sow Rate	Moisture	Exposure	Seed Size	Commercial Accessibility of Local Eco-type
Plagiobothrys figuaratus	Popcorn Flower	Fall/Spring	D	1.0lb/ac	NR	Inundated to wet	Sun	Small	Medium to difficult, Willamette Valley
Prunela vulgaris	Self Heal	Fall/Spring	D	2lbs/ac	1lb/ac	Wet to mesic	Sun/Shade	Medium	Easy to medium, PDX or Willamette Valley
Solidago canadensis	Goldenrod	Fall	D	.50lbs/ac	NR	Xeric to mesic	Sun	Small	Easy to medium, PDX or Willamette Valley

Recommended Non-Native Cover Crop Species

Common Name	Scientific Name	Optimal Sow Season	Matrix or to Add Diversity	Swale or Pond Sow Rate (Hand)	Erosion Control Sow Rate	Moisture	Exposure	Seed Size	Commercial Accessibility of Local Eco-type
Festuca rubra var. commutate	Chewings Fescue	Year Round	M	20lbs/ac	30- 40				n/a
Triticum spp.	Wheat	Year Round	M	50lbs/ac	60				n/a
Avena spp.	Oats	Year Round	M	50lbs/ac	60				n/a
Regreen	Sterile Wheat Hybrid	Year Round	M	40lbs/ac	50				n/a
Agropyon spp.	Wheatgrass	Year Round	M	30lbs/ac	40				A - trachycaulus (W.V. source)

Nuisance Grass Species NOT Recommended for use on Erosion Control or Stormwater Projects

Species	Common Name	State Listed - Noxious Weed	City
Agropyron repens	Quack Grass	Yes (B-list)	Nuisance List Portland Plant List
AQlopecuris pratensis	Meadow Foxtail	No	Nuisance List Portland Plant List
Anthoxanthum odoratum	Sweet Vernal Grass	No	Nuisance List Portland Plant List
Arrenatherum elatius	Tall Oat Grass	No	Nuisance List Portland Plant List
Brachypodium sylvaticum	False Brome	Yes (B-list)	Nuisance List Portland Plant List
Bromus diandrus	Ripgut	No	Nuisance List Portland Plant List

Species	Common Name	State Listed - Noxious Weed	City
Bromus hordaceus	Smooth Brome	No	Nuisance List Portland Plant List
Bromus inermis	Smooth Brome	No	Nuisance List Portland Plant List
Bromus japonicus	Japanese Brome	No	Nuisance List Portland Plant List
Bromus sterilis	Poverty Grass	No	Nuisance List Portland Plant List
Bromustectorum	Cheat Grass	No	Nuisance List Portland Plant List
Festuca arundinacea	Tall Fescue	No	Nuisance List Portland Plant List
Holcus lanatus	Velvet Grass	No	Nuisance List Portland Plant List
Lolium multiforum	Annual Rye Grass	No	Nuisance List Portland Plant List
Phalara arundinacea	Reed Canary Grass	No	Nuisance List Portland Plant List
Phalars aquatica	Harding Gras	No	Nuisance List Portland Plant List
Phleum pratensis	Timothy	No	Nuisance List Portland Plant List
Phragnites australis	Common Reed	No	Nuisance List Portland Plant List
Vulpia myoros	Rat-tailed Fescue	No	Nuisance List Portland Plant List

Explanation of Appendices to the Springfield Development Code Appendix G Approved Street Trees to Incorporate MS4 Permit Requirements

PROPOSED AMENDMENTS
Various sections of the Springfield Development Code (SDC) are amended to remove barriers to Low-Impact Development (LID) and define key stormwater terms. This appendix is proposed to be moved to the SDC from the Engineering Design Standards and Procedures Manual (EDSPM). The purpose of this is provide minimum criteria for street tree planting. The proposed amendments are shown in legislative format (deleted text with strike-thru red font and new text with double underline red font). Commentary is shown in *purple italics font*, preceding the text to which it is referring.

APPENDIX ~~6A~~ G

APPROVED STREET TREE LIST

COMMENTARY: *The street tree list was modified with staff and qualified professional's input. The species were reviewed for suitability in the location they are approved in, ease of maintenance, diseases and insect susceptibility, shade coverage potential and root intrusion problems. Notable changes are removal of all ash trees due to emerald ash borers arrival, removal of large conifers such as cedar and fir trees due to the large mature size being unsuitable to a denser urban environment and inclusion of the new blight resistant chestnut tree.*

APPROVED STREET TREE LIST

Street Trees for Under Powerlines	
Botanical Name	**Common Name**
Acer buergeranum	Trident Maple
Acer Camprestre	Field Maple
Acer Circinatum	Oregon Vine Maple
Acer ginnala	Amur Maple
Acer Grandidentatum	Bigtooth Maple
Acer tartaricum	Tartarian Maple
Acer truncatum	Shantung Maple
Amelanchier arborea	Shadbush
Amelanchier x grandiflora 'var.'	'Autumn Brilliance' Serviceberry
Amelanchier x grandiflora 'var.'	'Robin Hill' Serviceberry
Amelanchier Leavis	Smooth Shadbush, Smooth Serviceberry
Arbus unedo	Strawberry Tree
Carpinus Caroliana	American Hornbeam
Cercis	Redbud most varieties
Clerodendrum trichotomum	Glorybower Tree
Cornus florida	Flowering Dogwood
Cornus kousa	Korean Dogwood
Franklinia alatamaha	Franklin Tree
~~Fraxinus Oxycarpa~~	~~Golden Desert Ash~~
Heptacodium Miconoides	Seven Son Flower
Lagerstoemia Indica x L. Faurei	Crepe Myrtle
Mangnolia Lilliflora x sperengeri	Lily Magnolia
Stewartia Koreana	Korean Stewartia
Stewartia Mondadelpha	Tall Stweartia
Styrax Japonicus	Japanese Snowbell
Styrax Obassia	Fragrant Snowbell
~~Prunus subhirtella 'var.'~~	~~Whitcomb' Flowering Cherry~~
~~Prunus x yedoensis 'var.'~~	~~Akebono' Flowering Cherry~~
Syringa reticulata 'var.'	'Summer Snow' Japanese Tree Lilac

Street Trees for Parking Strips 4 Feet to 6 Feet Wide	
Botanical Name	**Common Name**
Acer campestre	Hedge Maple
Acer campestre 'var.'	'Queen Elizabeth' Hedge Maple
Acer cappadocicum	Coliseum Maple
Acer Grandidentatum	Bigtooth Maple
Acer griseum	Paperbark Maple
Acer platanoides 'var.'	'Olmsted' Norway Maple
Acer rubrum	Red Maple
Acer rubrum 'Armstrong'	'Armstrong' Red Maple
Acer rubrum 'var.'	'Autumn Flame' Red Maple
Acer rubrum 'var.'	'Bowhall' Red Maple
Acer rubrum 'var.'	'Karpick' Red Maple
Acer rubrum 'var.'	'October Glory' Red Maple
Acer rubrum 'var.'	'Red Sunset' Red Maple
Acer x freemanii 'var.'	'Armstrong II' Maple
Acer x freemanii 'var.'	'Autumn Blaze' Maple
Acer x freemanii 'var.'	'Autumn Fantasy' Maple
Acer x freemanii 'var.'	'Celebration' Maple
Acer x freemanii 'var.'	'Scarlet Sentinel' Maple
Aesculus x carnea 'var.'	'Briotti' Red Horsechestnut
Aesculus x carnea 'var.'	'Ft. McNair' Red Horsechestnut
Amelanchier x grandiflora	Serviceberry
Amelanchier x grandiflora 'var.'	'Cumulus' Serviceberry
Betula jacquemontii	Jacquemontii Birch
Carpinus betulus 'var.'	'Fastigiate' European Hornbeam
Carpinus carolinia	American Hornbeam
Celtis laevigata 'var.,'	'All Seasons' Sugar Hackberry
Celtis occidentalis	Hackberry
Celtis occidentalis 'var.'	'Chicagoland' Hackberry
Celtis occidentalis 'var.'	'Prairie Pride' Hackberry
Cercidiphyllum japonica	Katsura
Cercis canadensis	Redbud
Chionanthus virginicus	Fringe Tree
Chitalpa tashkentensis	Chitalpa
Cornus nuttallii	Pacific Dogwood
Davidia involucrata	Dove Tree
~~Fraxinus americana~~	~~White Ash~~
~~Fraxinus americana 'var.'~~	~~'Autumn Applause' White Ash~~
~~Fraxinus americana 'var.'~~	~~'Autumn Purple' White Ash~~
~~Fraxinus americana 'var.'~~	~~'Champaign Country' White Ash~~
~~Fraxinus americana 'var.'~~	~~'Rosehill' White Ash~~
~~Fraxinus excelsior 'var.'~~	~~'Globe-Headed' European Ash~~

~~Fraxinus ornus~~	~~Flowering Ash~~
~~Fraxinus oxycarpa 'var.'~~	~~'Raywood' Ash~~
~~Fraxinus pennsylvanica 'var.'~~	~~'Bergson' Green Ash~~
~~Fraxinus pennsylvanica 'var.'~~	~~'Marshall Seedless' Green Ash~~
Koelreuteria paniculata	Goldenrain Tree
Ostrya virginiana	American Hop Hornbeam
Parrotia persica	Persian Parrotia
Pistacia chinensis	Chinese Pistache
~~Prunus sargentii~~	~~Sargent Cherry~~
~~Prunus sargentii 'var.'~~	~~'Columnar' Sargent Cherry~~
~~Prunus serrula~~	~~Red Bark Cherry~~
~~Pyrus betulifolia 'var.'~~	~~'Dancer' Ornamental Pear~~
~~Pyrus calleryana~~	~~Callery Pear~~
~~Pyrus calleryana 'var.'~~	~~'Aristocrat' Callery Pear~~
~~Pyrus calleryana 'var.'~~	~~'Autumn Blaze' Callery Pear~~
~~Pyrus calleryana 'var.'~~	~~'Bradford' Callery Pear~~
~~Pyrus calleryana 'var.'~~	~~'Chanticleer' Callery Pear~~
~~Pyrus calleryana 'var.'~~	~~'Redspire' Callery Pear~~
~~Pyrus fauriei~~	~~Pea Pear~~
Quercus Gambeli	Gambel Oak
Stewartia pseudocamellia	Japanese Stewartia
Styrax japonicus	Japanese Snowball
Syringa reticulata ‘var’	Ivory Silk Japanese Tree Lilac

Street Trees for Parking Strips 6 Feet to 10 Feet Wide	
Botanical Name	**Common Name**
Acer campestre	Hedge Maple
Acer campestre 'var.'	'Queen Elizabeth' Hedge Maple
Acer cappadocicum	Coliseum Maple
Acer rubrum	Red Maple
Acer rubrum 'var.'	'Autumn Flame' Red Maple
Acer rubrum 'var.'	'Bowhall' Red Maple
Acer rubrum 'var.'	'Karpick' Red Maple
Acer rubrum 'var.'	'October Glory' Red Maple
Acer rubrum 'var.'	'Red Sunset' Red Maple
Acer saccharum	Sugar Maple
Acer saccharum 'var.'	'Legacy' Sugar Maple
Acer saccharum 'var.'	'Bonfire' Sugar Maple
Acer saccharum 'var.'	'Commemoration' Sugar Maple
Acer saccharum 'var.'	'Green Mountain' Sugar Maple
Acer saccharum 'var.'	'Seneca Chief' Sugar Maple
Acer truncatum x 'var.'	'Norwegian Sunset' Maple
Acer truncatum x 'var.'	'Pacific Sunset' Maple

Acer x freemanii 'var.'	'Autumn Blaze' Maple
Acer x freemanii 'var.'	'Autumn Fantasy' Maple
Acer x freemanii 'var.'	'Celebration' Maple
Acer x freemanii 'var.'	'Scarlet Sentinel' Maple
Aesculus hippocastanum 'var.'	'Bauman' Horsechestnut
Aesculus x carnea 'var.'	'Briotti' Red Horsechestnut
Aesculus x carnea 'var.'	'Ft. McNair' Red Horsechestnut
Castenea Dentata	Blight Resistant Chestnut
Carpinus betulus	European Hornbeam
Carpinus betulus 'var.'	'Fastigiate' European Hornbeam
Carpinus carolinia	American Hornbeam
Celtis laevigata 'var.,'	'All Seasons' Sugar Hackberry
Celtis occidentalis	Hackberry
Celtis occidentalis 'var.'	'Chicagoland' Hackberry
Celtis occidentalis 'var.'	'Prairie Pride' Hackberry
Cercidiphyllum japonica	Katsura
Cladrastis Jutea	Yellowwood
Davidia involucrata	Dove Tree
Eucommia ulmoides	Hardy Rubber Tree
~~Fraxinus americana~~	~~White Ash~~
~~Fraxinus americana 'var.'~~	~~'Autumn Applause' White Ash~~
~~Fraxinus americana 'var.'~~	~~'Autumn Purple' White Ash~~
~~Fraxinus americana 'var.'~~	~~'Champaign Country' White Ash~~
~~Fraxinus americana 'var.'~~	~~'Rosehill' White Ash~~
~~Fraxinus excelsior~~	~~European Ash~~
~~Fraxinus latifolia~~	~~Oregon Ash~~
~~Fraxinus ornus~~	~~Flowering Ash~~
~~Fraxinus oxycarpa 'var.'~~	~~'Raywood' Ash~~
~~Fraxinus pennsylvanica~~	~~Green Ash~~
~~Fraxinus pennsylvanica 'var.'~~	~~'Bergson' Green Ash~~
~~Fraxinus pennsylvanica 'var.'~~	~~'Cimmaron' Green Ash~~
~~Fraxinus pennsylvanica 'var.'~~	~~'Marshall Seedless' Green Ash~~
~~Fraxinus pennsylvanica 'var.'~~	~~'Patmore' Green Ash~~
~~Fraxinus pennsylvanica 'var.'~~	~~'Summit' Green Ash~~
~~Fraxinus pennsylvanica 'var.'~~	~~'Urbanite' Green Ash~~

Street Trees for Parking Strips 6 Feet to 8 Feet Wide (continued)	
Botanical Name	**Common Name**
Ginkgo biloba	Ginkgo Male Only
Ginkgo biloba 'var.'	'Autumn Gold' Ginkgo Male only
Ginkgo biloba 'var.'	'Lakeview' Ginkgo Male only
Ginkgo biloba 'var.'	'Magyar' Ginkgo male only
Ginkgo biloba 'var.'	'Princeton Sentry' Ginkgo male only
~~Gleditsia triacanthos 'var.'~~	~~'Imperial' Honeylocust~~
~~Gleditsia triacanthos 'var.'~~	~~'Moraine' Honeylocust~~
~~Gleditsia triacanthos 'var.'~~	~~'Shademaster' Honeylocust~~
~~Gleditsia triacanthos 'var.'~~	~~'Skyline' Honeylocust~~
Halesia carolina	Carolina Silverbell
Halesia monticola	Mountain Silverbell
Koelreuteria paniculata	Goldenrain Tree
Ostrya virginiana	American Hop Hornbeam
Parrotia persica	Persian Parrotia
Platanus acerifolia 'Bloodgood'	Bloodgood London Planetree
~~Pistacia chinensis~~	~~Chinese Pistache~~
~~Prunus serrulata~~	~~Flowering Cherry~~
~~Prunus serrulata 'var.'~~	~~'Kwanzan' Flowering Cherry~~
~~Prunus subhirtella~~	~~Higan Cherry~~
~~Prunus subhirtella 'var.'~~	~~'Rosy Cloud' Flowering Cherry~~
~~Prunus x yedoensis~~	~~Yoshino Flowering Cherry~~
~~Pyrus betulifolia 'var.'~~	~~'Dancer' Ornamental Pear~~
~~Pyrus calleryana~~	~~Callery Pear~~
~~Pyrus calleryana 'var.'~~	~~'Aristocrat' Callery Pear~~
~~Pyrus calleryana 'var.'~~	~~'Autumn Blaze' Callery Pear~~
~~Pyrus calleryana 'var.'~~	~~'Chanticleer' Callery Pear~~
~~Pyrus calleryana 'var.'~~	~~'Redspire' Callery Pear~~
~~Pyrus fauriei~~	~~Pea Pear~~
Quercus robur	English Oak
Quercus robur 'var.'	'Skymaster' English Oak
Quercus rubra	Northern Red Oak
Quercus garryana	Oregon White Oak
Quercus Shumardii	Shumard Oak
Sophora japonica	Scholartree
Sophora japonica 'var.'	'Princeton Upright' Scholartree
Sophora japonica 'var.'	'Regent' Scholartree
Umbellularia californica	Oregon Myrtle
Zelkova serrata	Japanese Zelkova
Zelkova serrata 'var.'	'Green Vase' Japanese Zelkova
Zelkova serrata 'var.'	'Halka' Japanese Zelkova
Zelkova serrata 'var.'	'Village Green' Japanese Zelkova

Street Trees for Parking Strips 10 ~~12~~ Feet Wide and Larger	
Botanical Name	**Common Name**
Acer macrophyllum	Bigleaf Maple
Acer nigrum	Black Maple
Acer nigrum 'var.'	'Green Column' Black Maple
~~Acer platanoides~~	~~Norway Maple'Cleveland'~~
~~Acer platanoides 'var.'~~	~~Norway Maple~~
~~Acer platanoides 'var.'~~	~~'Crimson King' Norway Maple~~
~~Acer platanoides 'var.'~~	~~'Deborah' Norway Maple~~
~~Acer platanoides 'var.'~~	~~'Emerald Lustre' Norway Maple~~
~~Acer platanoides 'var.'~~	~~'Emerald Queen' Norway Maple~~
~~Acer platanoides 'var.'~~	~~'Schwedler' Norway Maple~~
~~Acer platanoides 'var.'~~	~~'Summershade' Norway Maple~~
Acer pseudoplatanus	Sycamore Maple
Acer pseudoplatanus 'var.'	'Lustre' Sycamore Maple
Acer pseudoplatanus 'var.'	'Spaethii' Sycamore Maple
Acer saccharum	Sugar Maple
Acer saccharum 'var.'	'Legacy' Sugar Maple
Acer saccharum 'var.'	'Bonfire' Sugar Maple
Acer saccharum 'var.'	'Commemoration' Sugar Maple
Acer saccharum 'var.'	'Green Mountain' Sugar Maple
Acer saccharum 'var.'	'Seneca Chief' Sugar Maple
Aesculus hippocastanum	Common Horsechestnut
Aesculus hippocastanum 'var.'	'Bauman' Horsechestnut
~~Castenea Dentata~~	~~Blight Resistant Chestnut~~
Carpinus betulus	European Hornbeam
Celtis laevigata	Sugar Hackberry
Cladrastis lutea	Yellowwood
Eucommia ulmoides	Hardy Rubber Tree
Ginkgo biloba	Ginkgo male only
Ginkgo biloba 'var.'	'Autumn Gold' Ginkgo male only
Ginkgo biloba 'var.'	'Lakeview' Ginkgo male only
Ginkgo biloba 'var.'	'Magyar' Ginkgo male only
Ginkgo biloba 'var.'	'Princeton Sentry' Ginkgo male only
Gymnocladus dioicus	Kentucky Coffeetree
Gymnoclaudus dioicus 'var.'	'Expresso' Kentucky Coffeetree
Halesia carolina	Carolina Silverbell
Halesia monticola	Mountain Silverbell
~~Liquidambar styraciflua~~	~~Sweet Gum~~
~~Liquidambar styraciflua 'var.'~~	~~'Burgundy" Sweet Gum~~
~~Liquidambar styraciflua 'var.'~~	~~'Moraine' Sweet Gum~~
Liriodendron tulipifera	Tulip Tree
Lithocarpus densiflorus	Tanbark Oak

Magnolia grandiflora	Southern Magnolia
Nyssa sylvatica	Blackgum
Quercus bicolor	Swamp White Oak
Quercus coccinea	Scarlet Oak
Quercus Douglassi	Blue Oak
Quercus Lobata	Valley Oak
Quercus frainetto 'var.'	'Forest Green' Hungarian Oak
Quercus macrocarpa	Bur Oak
Quercus phellos	Willow Oak
Quercus robur	English Oak
Quercus robur 'var.'	'Skymaster' English Oak
Quercus rubra	Northern Red Oak
Quercus shumardii	Shumard Oak
Sophora japonica	Scholartree
Sophora japonica 'var.'	'Princeton Upright' Scholartree
Sophora japonica 'var.'	'Regent' Scholartree
Tilia americana	American Linden
Tilia americana 'var,'	'Redmond' American Linden
Tilia americana 'var.'	'Legend' American Linden
Tilia tomentosa	Silver Linden
Tilia Platyphyllos	Bigleaf Linden
Tilia x euchlora	Crimean Linden
Ulmus accolade	Accolade Elm Dutch elm disease tolerant only
Ulmus parvifolia	Chinese Elm Dutch elm disease tolerant only
Umbellularia californica	Oregon Myrtle
Zelkova serrata	Japanese Zelkova
Zelkova serrata 'var.'	'Green Vase' Japanese Zelkova
Zelkova serrata 'var.'	'Halka' Japanese Zelkova
Zelkova serrata 'var.'	'Village Green' Japanese Zelkova

Explanation of Appendices to the Springfield Development Code Appendix H Onsite Source Stormwater Controls to Incorporate MS4 Permit Requirements

PROPOSED AMENDMENTS
Various Sections of the Springfield Development Code (SDC) are amended to remove barriers to Low-Impact Development and define stormwater terms. The proposed amendments are shown in legislative format (deleted text with strike-thru red font and new text with double underline red font). Commentary is shown in purple italics font, preceding the text to which it is referring.

APPENDIX H

Onsite Source Stormwater Controls

COMMENTARY: Previously we had included this in our EDSPM by reference to the Eugene Stormwater Manual. As part of our continuing code revision efforts this was brought in from Chapter 3 of the Eugene manual with minimum changes so everything is contained in the City of Springfield Documents. These are the same measures the city has been requiring for several years for all commercial and industrial developments.

(A) Overview

(1) Some site characteristics and uses may generate specific pollutants that are not addressed solely through implementation of the stormwater quality measures identified in 4.3.110. The site characteristics and uses in this chapter have been identified as potential sources for chronic loadings or acute releases of pollutants such as oil and grease, toxic hydrocarbons, heavy metals, toxic compounds, solvents, abnormal pH levels, nutrients, organics, bacteria, chemicals, and suspended solids. This appendix presents source controls for managing these pollutants at their source.

(2) Industrial facilities may be subject to additional requirements through State of Oregon issued NPDES permits or as outlined in Oregon Administrative Rules (OAR) 340 Division 041.

(3) Springfield Municipal Code 4.372 lists prohibited discharges to the City's storm sewer system. The City has used these standards in the development of the listed source controls so stormwater discharges can better meet these criteria. The implementation of this chapter is in addition to the applicable water quality, flow control, and flood control requirements.

(4) Applicants may propose alternatives to the source controls identified in this chapter. Proposal of an alternative source control or alternative design element will require an additional review process and may delay issuance of related building or public works permits.

(B) Site Uses and Characteristics That Trigger Source Controls

(1) As provided in SDC 4.3.110(C)(8), development that includes any of the following uses and characteristics are subject to the design methodologies of this chapter:

(a) Fuel Dispensing Facilities and Surrounding Traffic Areas (Section C)

(b) Above-Ground Storage of Liquid Materials (Section D)

(c) Solid Waste Storage Areas, Containers, and Trash Compactors (Section E)

(d) Outdoor Storage of Bulk Materials (Section F)

(e) Material Transfer Areas/Loading Docks (Section G)

(f) Equipment and/or Vehicle Washing Facilities (Section H)

(g) Covered Vehicle Parking Areas (Section I)

Applicants are required to address all of the site characteristics and uses listed in Sections (C) through (I). For example, if a development includes both a fuel dispensing area and a vehicle washing facility, the source controls in both Sections (C) and (H) will apply.

(2) Source Control Goals and Objectives

(a) The specific source control standards are based on the following goals and objectives:

(i) Prevent stormwater pollution by eliminating pathways that may introduce pollutants into stormwater.

(ii) Protect soil, groundwater and surface water by capturing acute releases and reducing chronic contamination of the environment.

(iii) Direct wastewater discharges (including wash water) to a sanitary sewer system.

(iv) Direct areas that have the potential for acute releases or accidental spills, and are not expected to regularly receive flow or require water use (such as covered fuel islands or covered containment areas), to an approved method of containment or destination.

(v) Safely contain spills on-site, avoiding preventable discharges to sanitary sewer facilities, surface water bodies, or underground injection control structures (UICs).

(vi) Emphasize structural controls over operational procedures. Structural controls are not operator dependent and are considered to provide more permanent and reliable source control. Any proposals for operation-based source controls need to describe the long-term viability of the maintenance program.

(3) Signage

(a) Informational signage is required for certain site uses and activities that may pollute stormwater. Signage addresses good housekeeping rules and provides emergency response measures in case of an accidental spill. Required spill response supplies must be clearly marked, located where the signage is posted (or the location of the supplies must be clearly indicated by the signage), and must be located near the high-risk activity area. Required spill response supplies, such as absorbent material and protective clothing, should be available at all potential spill areas. Employees must be familiar with the site's operations and maintenance plan and proper spill cleanup procedures.

(b) All signage must conform to the standards described below. Additional signage for specific activities is noted in applicable Sections C through I.

(c) Signs must be 8.5" x 11" or larger and located and plainly visible from all activity areas. More than one sign may be needed to accommodate larger activity areas. Signs must be water-resistant and include the following information:

(i) Safety precautions for self-protection and spill containment.

(ii) Immediate spill response procedures—for example: "Turn the valve located at..." or "Use absorbent materials"

(iii) Emergency contact(s) and telephone number(s)—for example: "Call 911" and "City of Springfield Public Works"

(C) Fuel Dispensing Facilities

(1) Fuel Dispensing Facilities include areas where fuel is transferred from bulk storage tanks to vehicles, equipment, and/or mobile containers (including fuel islands, above ground fuel tanks, fuel pumps, and the surrounding pad). This applies to large-sized gas stations as well as single-pump fueling operations.

(2) Cover

(a) The fuel dispensing area must be covered with a permanent canopy, roof, or awning so precipitation cannot come in contact with the fueling activity areas. Rainfall must be directed from the cover to an approved stormwater destination.

(b) Covers 10 feet high or less must have a minimum overhang of 3 feet on each side. The overhang must be measured relative to the perimeter of the hydraulically isolated fueling activity area/pad it is to cover.

(c) Covers higher than 10 feet must have a minimum overhang of 5 feet on each side. The overhang must be measured relative to the perimeter of the hydraulically isolated fueling activity area/pad it is to cover.

(3) Pavement

(a) A paved fueling pad must be placed under and around the fueling activity area with asphalt or concrete and must meet all applicable building code requirements.

(b) Sizing of the paved areas must be adequate to cover the activity area, including placement and number of the vehicles or pieces of equipment to be fueled by each pump.

(c) Fuel pumps must be located a minimum of seven feet from the edge of the fueling pad.

(4) Drainage

(a) The paved area beneath the cover must be hydraulically isolated through grading, berms, or drains. This will prevent uncontaminated stormwater from running onto the area and carrying pollutants away.

(b) Drainage from the hydraulically isolated area must be directed to an approved City sanitary sewer system, or authorized pretreatment facility.

(c) Surrounding runoff must be directed away from the hydraulically isolated fueling pad to a stormwater destination that meet all stormwater management practices of the Springfield Development code and other applicable code requirements.

(5) Signage

(a) Signage must be provided at the fuel dispensing area and must be plainly visible from all fueling activity areas.

(b) Signage must clearly specify the location of any applicable spill control kits, shut-off valves, etc. and include all necessary instructions for their use.

(6) Spill Control Manhole

(a) A spill control manhole must be installed on the discharge line of the fueling pad (before the domestic waste line tie-in).

(b) The tee section must extend 18 inches below the outlet elevation, with an additional 3 feet of dead storage volume below the tee to provide storage for oil and grease.

(c) The total containment volume must be no less than 110% the volume of the largest container or 10% of the total volume of product stored, whichever is larger.

(d) The manhole must be located on private property.

(7) Shut-Off Valves

(a) Shut-off valves are required to protect the City sewer systems or onsite infiltration facilities of spill risks from chemicals and other constituents that provide a danger for wide spread contamination, system damages or risk to the public health. Manual shut-off valves must not be permitted unless a request for an adjustment is approved by the City.

(b) Shut-off valves will be required in the following situations:

(i) Site or activity areas where corrosives or oxidizers are used or stored (for example, concentrated acids are corrosives having a pH of less than or equal to 5.0 and bases such as sodium or ammonium hydroxide having a pH of greater than or equal to 12.0, common oxidizers are hydrogen peroxide and bleach); or

(ii) Substances which are water soluble or float on water; or

(iii) Solvents and petroleum products

(c) Traffic pathways that surround the fueling pad, also designated as high-use/high-risk areas, will require a shut-off valve on the storm drainage system.

(i) Valves installed on storm drainage systems must be installed downstream of all private stormwater quality facilities to accommodate spill containment.

(ii) These valves should be left open to facilitate stormwater flows during normal conditions, and immediately closed in the event of a spill.

(iii) The switch or handle to operate the shut-off valve must be clearly marked and accessible, and identified on the signage at the fuel dispensing area. In the event of a spill the valve must remain closed until all spilled fuel and residue has been properly removed and disposed of.

(d) Fueling pads will require a shut-off valve downstream of the spill control manhole.

(i) Valves installed on sanitary sewer systems must be installed before the domestic waste line tie-in.

(ii) These valves must automatically revert to the closed position.

(iii) These valves must be kept closed, and opened only to allow incidental drainage activities that do not pose to be a threat or risk to the destination system.

(e) Shut-off valves must be located on private property and downstream of the exposed area's collection system.

(i) All valves must be installed and maintained as per manufacturer's recommendations. For more information about shut-off valves and associated valve boxes, contact Building & Permit Services at 541-682-5086.

(8) Additional Requirements

(a) Installation, alteration, or removal of above-ground fuel tanks larger than 55 gallons, and any related equipment, are subject to additional permitting requirements by the Springfield-Eugene Fire Marshal's Office. For technical questions and permitting, call the Fire Marshal's Office Permit Center at 541-682-5411, or visit them at Permit & Information Center, 99 W. 10th Avenue, Eugene, OR 97401.

(b) Bulk fuel terminals, also known as tank farms, will require the following:

(i) Secondary containment equal to 110 percent of the product's largest container or 10 percent of the total volume of product stored, whichever is larger.

(ii) A separate containment area for all valves, pumps and coupling areas with sub-bermed areas either in front of or inside the main containment areas. These sub-bermed areas are required to have

rain shields and be directed to a City sanitary sewer destination that meets all applicable code requirements if no City sanitary sewer facility is available, drainage must be directed to a temporary holding facility for proper disposal.

(iii) An impervious floor within all containment areas. Floors must be sealed to prevent spills from contaminating the groundwater.

(iv) Truck loading and off-loading areas. These areas must follow cover, pavement, drainage, spill control, and shut-off valve requirements identified for fuel dispensing facilities.

(v) Shut-off valves installed for the drainage of the tank yard, must be installed downstream of the drainage system of the primary containment area, and kept closed. Valves installed for the drainage of the truck pad and sub-bermed containment areas must be installed on the sanitary sewer line downstream of the spill control manhole.

(vi) A batch discharge authorization before draining a containment area. This authorization will determine appropriate disposal methods, identify pretreatment requirements (if applicable), and authorize the discharge. Pretreatment may be required for oil and grease removal, and testing may be required to establish the specific characteristics of the discharge.

(c) Underground fuel tanks less than 4,000 gallons in size are subject to additional permitting requirements by Oregon's Department of Environmental Quality (DEQ) and tanks larger than 4,000 gallons are referred to the Federal Environmental Protection Agency (EPA). For technical questions and permitting, call DEQ's NW Region main office at 1-800-844-8467 and ask for the Underground Storage Tank Permitting Department.

(D) Above-ground Storage of Liquid Materials

(1) Above-Ground Storage of Liquid Materials include places where exterior storage (either permanent or temporary) of liquid chemicals, food products, waste oils, solvents, or petroleum products in above-ground containers, in quantities of 50 gallons or more exist.

(2) Containment

(a) Liquid materials must be stored and contained in such a manner that if the container(s) is ruptured, the contents will not discharge, flow, or be washed into a receiving system.

(b) A containment device and/or structure for accidental spills must have enough capacity to capture a minimum of 110 percent of the product's largest container or 10 percent of the total volume of product stored, whichever is larger. Containers, such as double-walled containers, with internal protection are considered to meet this requirement.

(3) Cover

(a) Storage containers (other than tanks) must be completely covered to prevent stormwater contact. Runoff must be directed from the cover to a stormwater destination that meets all applicable code requirements.

(b) Covers 10 feet high or less must have a minimum overhang of 3 feet on each side. The overhang must be measured relative to the perimeter of the hydraulically isolated activity area.

(c) Covers higher than 10 feet must have a minimum overhang of 5 feet on each side. The overhang must be measured relative to the perimeter of the hydraulically isolated activity area.

(2) Pavement

(a) All above ground storage of liquid material must occur in paved areas. The storage area must be paved with asphalt or concrete and must meet all applicable building code requirements. Sizing of the paved areas must be adequate to cover the area intended for storage.

(3) Drainage

(a) All paved storage areas must be hydraulically isolated through grading, berms, or drains to prevent uncontaminated stormwater run-on to a storage area.

(b) Covered storage areas:

(i) Significant amounts of precipitation are not expected to accumulate in covered storage areas, and drainage facilities are not required for the contained area beneath the cover.

(ii) If the applicant elects to install drainage facilities, the drainage from the hydraulically isolated area must be directed to a sanitary sewer destination that meets all applicable code criteria.

(c) Uncovered storage areas with containment:

(i) Water will accumulate in uncovered storage areas during and after rain. Any contaminated water cannot simply be drained from the area. It must be collected, inspected, and tested at the expense of the property owner before proper disposal can be determined.

(ii) Some type of monitoring may also be needed to determine the characteristics and level of contamination of the stormwater.

(d) All discharges to the sanitary sewer system must be considered batch discharges and must require approval and meet applicable code requirements.

(i) Pretreatment requirements must be set as part of the discharge approval process, based on the types and quantities of material to be discharged.

(ii) A discharge evaluation must be performed before connection to a sanitary sewer facility.

(iii) Testing may be required to establish characteristics of the sanitary sewer or contaminated stormwater and to verify that local discharge limits are not exceeded. MWMC illicit discharge staff can be contacted to start this process.

(4) Signage

(a) Signage must be provided at the liquid storage area and must be plainly visible from all surrounding activity areas.

(E) Solid Waste Storage

(1) Solid Waste Storage Areas, Containers, and Trash Compactors include outdoor areas with one or more facilities that store solid waste (both food and non-food waste) containers.

(a) One- and two-family residential solid waste storage areas, containers, and trash compactors are exempt from this code subsection.

(b) Solid waste includes both food and non-food waste or recycling. Solid waste containers include compactors, dumpsters, compost bins, grease bins, recycling areas, and garbage cans.

(c) Debris collection areas used only for the storage of wood pallets or cardboard is excluded from these requirements.

(d) The following site uses and activities include all commercial and industrial development with facilities that store solid wastes, both food and non-food.

(i) Outdoor solid waste storage areas.

(ii) Multi-family residential sites if a shared trash collection area is proposed.

(iii) Activity areas used to collect and store refuse or recyclable materials, such as can or bottle return stations and debris collection areas.

(iv) Facilities whose business is to process and/or recycle wood pallets or cardboard.

(2) Design

(a) For approval of solid waste storage and handling activity areas in the City of Springfield, the following design requirements will apply. See below for a clarification of each requirement:

Activity/Use	Requirements			
	Cover	Pavement	Hydraulicly Isolated	Sanitary Sewer Drain
Multi Residential (with shared trash areas)	X	X	X	X
Commercial	X	X	X	X
Industrial	X	X	X	X
Compactors (regardless of use)	X	X	X	X
Can and Bottle Return Stations	X	X	X	X

(3) Cover

(a) A permanent canopy, roof, or awning must be provided to cover the solid waste storage activity area and must be constructed to cover the activity area so rainfall cannot come in contact with the waste materials being stored. The cover must be sized relative to the perimeter of the hydraulically isolated activity area it is to cover. Runoff must be directed from the cover to a stormwater destination that meets all applicable code requirements.

(F) Outdoor Storage of Bulk Materials

Any bulk materials storage location that is not completely enclosed by a roof and sidewalls is an outdoor storage area.

(1) Bulk Materials Categories

(a) Bulk materials are separated into three categories based on risk assessments for each material stored: high-risk, low-risk, and exempt.

High-Risk Materials	Low-Risk Materials	Exempt Materials

• Recycling materials with potential effluent • Corrosive materials (e.g. lead-acid batteries) • Storage and processing of food items • Chalk/gypsum products • Feedstock/grain • Material by-products with potential effluent • Asphalt • Fertilizer • Pesticides • Lime/lye/soda ash • Animal/human wastes • Treated Lumber	• Recycling materials without potential effluent • Scrap or salvage goods • Metal • Sawdust/bark chips • Sand/dirt/soil (including contaminated soil piles) • Material by-products without potential effluent • Unwashed gravel/rock • Composting Operations	• Washed gravel/rock • Finished lumber • Plastic products (hoses, gaskets, pipe, etc.) • Clean concrete products (blocks, pipe, etc.) • Glass products (new, non-recycled)

(2) Cover

(a) Low-risk materials must be covered with a temporary plastic film or sheeting at a minimum.

(b) High-risk materials are required to be permanently covered with a canopy or roof to prevent stormwater contact and minimize the quantity of rainfall entering the storage area. Runoff must be directed from the cover to a stormwater destination that meets all applicable code requirements.

(c) Covers 10 feet high or less must have a minimum overhang of 3 feet on each side. The overhang must be measured relative to the perimeter of the hydraulically isolated activity area.

(d) Covers higher than 10 feet must have a minimum overhang of 5 feet on each side. The overhang must be measured relative to the perimeter of the hydraulically isolated activity area.

(3) Pavement

(a) Low-risk and exempt material storage areas are not required to be paved.

(b) High-risk material storage areas must be paved beneath the structural cover.

(4) Drainage

(a) Low-risk material storage areas are allowed in areas served by standard stormwater management systems. However, all erodible materials being stored must be protected from rainfall.

(b) If materials are erodible, a structural containment barrier must be placed on at least three sides of every stockpile to act as a barrier to prevent uncontaminated stormwater from running onto the storage area and carrying pollutants away.

(i) If the area under the stockpile is paved, the barrier can be constructed of asphalt berms, concrete curbing, or retaining walls.

(ii) If the area under the stockpile is unpaved, sunken retaining walls can be used. The applicant must clearly identify the method of containment on the building plans.

(c) For high-risk material storage areas, the paved area beneath the structural cover must be hydraulically isolated through grading, structural containment berms or walls, or perimeter drains to prevent runoff.

(i) Significant amounts of precipitation are not expected to accumulate in covered storage areas, and drainage facilities are not required for the containment area beneath the cover.

(ii) If the applicant elects to install drainage facilities, the drainage from the hydraulically isolated area must be directed to the City's sanitary sewer (with approval from the MWMC Illicit discharge division) and must meet all applicable code criteria.

(5) Additional Requirements

(a) Storage of pesticides and fertilizers may need to comply with specific regulations outlined by the Oregon Department of Environmental Quality (DEQ). For answers to technical questions, call DEQ's NW Region main office at 1-800-844-8467.

(b) A sampling manhole or other suitable stormwater monitoring access point may be required to monitor stormwater runoff from the storage area. This may apply to certain types of storage activities and materials or if an alternative source control is proposed. This requirement complies with Springfield Development Code 4.3.110D, which requires discharge to be treated. PW staff will review for applicability of this requirement.

(c) Signage must be provided at the storage area if hazardous materials or other materials of concern are stored. Signage must be located so it is plainly visible from all storage activity areas. More than one sign may be needed to accommodate large storage areas.

(d) If the applicant elects to install drainage facilities to the City's sanitary sewer system, a shut-off valve must be required for the structurally covered storage area.

(6) Alternative Protection Measures

(a) In lieu of covering mineral resource mining, recovery, stockpiling, and processing operations and low-risk material storage areas receiving land use approval, the applicant may propose alternative protection measures that demonstrate that stormwater runoff from the site will not contaminate adjoining properties, surface waters, and ground water as part of their land use application.

(G) Material Transfer Areas/Loading Docs

(1) Material Transfer Areas/Loading Docks include areas that are either interior or exterior to a building, designed to accommodate a commercial truck/trailer being backed up to or into them, and used specifically to receive or distribute materials to and/or from commercial trucks/trailers. Includes loading/unloading facilities with docks, and large bay doors without docks.

(a) These requirements also apply to all development proposing the installation of new material transfer areas or structural alterations to existing material transfer areas (e.g., access ramp regrading, leveler installations) with the following characteristics:

(i) The area is designed (size, width, etc.) to accommodate a commercial truck (1 ton and larger) or trailer being backed up to or into it; and

(ii) The area is designed so that it can be used to receive or distribute materials to and from trucks or trailers from any side.

(b) Two standard types of material transfer areas associated with buildings are:

(i) Loading/unloading facilities with docks

(ii) Large bay doors without docks

(c) The requirements in this section do not apply to material transfer areas or loading docks used only for mid-sized to small-sized passenger vehicles and areas restricted by lease agreements or other regulatory requirements to storing, transporting or using materials that are classified as domestic use, for example, primary educational facilities (elementary,

middle or high schools), or buildings used for temporary storage, and churches.

(2) Cover

(a) The hydraulically isolated areas in front of loading docks are required to be permanently covered with a canopy or roof to prevent stormwater contact and to minimize the quantity of rainfall entering the loading dock area. Runoff must be directed from the cover to a stormwater destination that meets all applicable code requirements.

(b) Covers 10 feet high or less must have a minimum overhang of 3 feet on each side. The overhang must be measured relative to the perimeter of the hydraulically isolated activity area.

(c) Covers higher than 10 feet must have a minimum overhang of 5 feet on each side. The overhang must be measured relative to the perimeter of the hydraulically isolated activity area.

(3) Pavement

(a) A paved material transfer area must be placed underneath and around the loading and unloading activity area with asphalt or concrete that meets all applicable building code requirements. This will reduce the potential for soil contamination with potential impacts on groundwater and will help control any acute or chronic release of materials present in these areas.

(4) Drainage

(a) Loading Docks:

(i) Drainage from the hydraulically isolated area must be directed to a sanitary sewer that meets all applicable code requirements. Surrounding runoff and drainage from the access ramp must be directed away from the hydraulically isolated area to a stormwater destination that meets all applicable requirements of the Springfield Development Code.

(ii) The requirement for the drainage from the hydraulically isolated area of the loading dock to be directed to the City's sanitary sewer, or authorized pretreatment facility may be waived if PW determines there is no gravity sanitary sewer service available and an appropriately sized, underground temporary storage structure (such as a catch basin with no outlet or dead-end sump) is provided.

(5) Non-Gravity Option

(a) Activity areas that cannot achieve gravity sanitary sewer service may be allowed to install a pressurized (pumped) system. These types of installations will require the following to be provided at the time of building permit application:

(i) Proof that gravity sanitary sewer service cannot be obtained; and

(ii) Details of an electronic sump pump system equipped with a float switch

(b) Pressurized system installations are considered "permanent equipment" and deemed the property owner's liability in the event of system failure or if the property becomes vacated.

(c) The Building & Permit Services will review all sump pump or sewage ejector installations for compliance with Uniform Plumbing Code and Oregon State Plumbing Specialty Code.

(d) Bay Doors and Other Interior Transfer Areas: Because interior material transfer areas are not expected to accumulate precipitation, installation of floor drains is not required or recommended. It is preferable to handle these areas with a dry-mop or absorbent material. If interior floor drains are installed, they must be plumbed to the City's sanitary sewer facility or authorized pretreatment facility. Interior transfer areas may not be sloped to drain to the exterior of the building.

(e) Bay doors and other interior transfer areas must be designed so that stormwater runoff does not enter the building. This can be accomplished by grading or drains. Interior surfaces may not drain or be washed down to the exterior of the building.

(6) Signage

(a) Signage must be provided at the material transfer area and must be plainly visible from all surrounding activity areas.

(5) Additional Requirements

(a) Bay doors and other interior transfer areas must provide a 10-foot "no obstruction zone" beyond the entrance within the building. This will allow the transfer of materials to occur with the truck or trailer end placed at least 5 feet inside the building, with an additional staging area of 5 feet beyond that. The "no obstruction" zone must be clearly identified on the stormwater management plan and on the building plan at the time of the

building permit application. The area must be identified at the facility by painting the “no obstruction zone” with bright or fluorescent floor paint.

(b) Shut-off valves will be required under the following situations:

(i) Site activity areas that are exposed to corrosives or oxidizers that can harm conveyance system components (such as battery acid).

(ii) Substances that do not settle or remain in one location, but are capable of being dissolved in or float on top of water (such as oil and grease). These substances can spread rapidly into downstream systems, causing widespread impacts and difficult clean-up situations.

(iii) Substances that are known to infiltrate through soils and contaminate groundwater.

(c) Valves located in material transfer areas are typically left open to facilitate drainage during normal conditions, and immediately closed in the event of a spill.

(d) Prior to transfer activities of harmful substances, the valves should be closed and only re-opened after the transfer is complete. The shut-off valves must be located on private property and downstream of the exposed area’s collection system.

(H) Equipment and/or Vehicle Washing Facilities

(1) Equipment and/or Vehicle Washing Facilities include designated equipment and/or vehicle washing or steam cleaning areas, including smaller activity areas such as wheel washing stations.

(2) Cover

(a) The washing area must be covered with a permanent canopy or roof so precipitation cannot come in contact with the washing activity area. Precipitation must be directed from the cover to a stormwater destination that meets all applicable code requirements.

(b) Covers 10 feet high or less must have a minimum overhang of 3 feet on each side. The overhang must be measured relative to the perimeter of the hydraulically isolated washing activity area it is to cover.

(c) Covers higher than 10 feet must have a minimum overhang of 5 feet on each side. The overhang must be measured relative to the perimeter of the hydraulically isolated washing activity area it is to cover.

(3) Pavement

(a) A paved wash pad must be placed under and around the washing activity area with asphalt or concrete that meets all applicable building code requirements. Sizing of the paved area must adequately cover the activity area, including the placement of the vehicle or piece of equipment to be cleaned.

(4) Drainage

(a) The paved area beneath the cover must be hydraulically isolated through grading, berms, or drains to prevent uncontaminated stormwater from running onto the area and carrying pollutants away.

(b) Drainage from the hydraulically isolated area must be directed to the City's sanitary sewer, or authorized pretreatment facility.

(c) Surrounding runoff must be directed away from the hydraulically isolated washing pad to a stormwater destination that meets all applicable requirements of the Springfield Development Code.

(5) Oil Control

(a) All vehicle and equipment washing activities will be reviewed for needed oil controls to comply with the City's adopted plumbing code and Metropolitan Wastewater Management Commission requirements for pretreatment.

(b) The following design criteria are established for oil/water separators discharging to a sanitary sewer facility:

(i) Washing Areas Protected with a Cover or Located Inside a Structure:

Baffled oil/water separators and spill control (SC-Type) separators must not be allowed for use with equipment and/or vehicle washing applications.

Note: activities and processes of a washing facility change over time and the introduction of heat and surfactants may occur.

(ii) Coalescing plate separators must be designed to achieve 100 ppm non-polar oil and grease in the effluent from the peak flow generated by the washing activity. Testing information must be submitted by the manufacturer of the unit that supports the 100 ppm effluent standard at the calculated flow rate. Standard flow from a 5/8" hose is estimated to be 10 gpm. For specially

designed washing units, check the vendor specifications for maximum flow rates.

(iii) Any pumping devices must be installed downstream of the separator to prevent oil emulsification.

(iv) Separator details must be shown on the building plans submitted for permit, and must match manufacturer specifications and details, including the unit flow rate, effluent water quality, and maximum process flow rate.

(c) On-site Wash Recycling Systems Wash may be used for oil control as long as they can meet effluent discharge limits for the City's sanitary sewer system. A detail of the wash recycling system and vendor specifications identifying effluent efficiencies must be submitted as part of the building plans at the time of building permit application.

(l) Covered Vehicle Parking Structures

(1) Covered Vehicle Parking Structures include enclosed buildings, not including single-level covers such as canopies, overhangs, and carports, used to cover parked vehicles.

(2) Drainage

(a) Stormwater runoff from the top floor of a multi-level parking structure must be directed to a stormwater destination that meets all water quality requirements of the Springfield Development Code and any other applicable code requirements.

(b) Drainage from lower floor of a multi-level parking structure is not expected to accumulate significant amounts of precipitation runoff and drainage facilities are not required for the lower floors.

(c) If the applicant elects to install drainage facilities, the drainage from the lower floors must be directed to the sanitary sewer.

(3) Adjacent, Uncovered Portions of the Site

(a) The surrounding uncovered portions of the site must be designed so stormwater does not enter the covered parking areas. This can be accomplished through grading, drains, or exterior walls

STORMWATER POST-CONSTRUCTION REQUIREMENTS – KEY CHANGES

This list identifies and explains the key substantive changes proposed for Springfield's Stormwater Management Section of the Springfield Development Code (SDC) 4.3.110 and various other sections of the Code. It may be helpful to use this document to review the proposed code language. Specific code references are included as appropriate. Code changes are shown in track changes in the Legislative Version. The Clean Version shows how the code would read if the changes are adopted as presented.

The package of proposed code amendments:

1. CI (Campus Industrial) District –Design Standards – Consistent with the MS4 Permit, allows vegetation within structural stormwater controls – see SDC 3.2.450 (B).

2. Mixed-Use District Development Standards – General – Clarifies that one of the intents of landscaping and screening within the Mixed-Use District is to provide opportunities for stormwater controls including Low Impact Development – see SDC 3.2.625.

3. Drinking Water Protection Overlay District – Allows dry wells for residential roof drainage, does not allow the use of certain materials including liquid fuel for generators, and clarifies terms throughout SDC 3.3.200.

4. Public Streets – Clarifies and encourages the use Low Impact Development approaches - green street design (designs using of stormwater planters, swales, rain gardens and street trees) – see SDC 4.2.105.

5. Sidewalks – Clarifies that Low Impact Development approaches may be placed in sidewalk planter strips – see SDC 4.2.135.

6. Stormwater Management – see SDC 4.3.110

(A) Definitions – Includes definitions specific to stormwater management in this Section of the Springfield Development Code (SDC). Because only specific definitions are included in this section, the definitions in SDC 6.6.110 are still applicable to stormwater.

(B) Applicability – Creates an applicability section and defines structural stormwater controls.

(C) Stormwater Structural Controls – General Standards – Defines the two types of performance standards for structural stormwater control facilities. Requires that all structural stormwater controls be designed, operated, and maintained to comply with the appendices in the SDC or Engineering Manual (EDSPM). Move SDC 4.3.110(6) Identification of Water Quality Limited Watercourses

and SDC 4.3.110(7) Protection of Riparian Area Functions to SDC 4.3.115 Water Quality Protection. Addresses permeable pavements, injection wells, on site source controls for high-risk land uses (which previously resided in Chapter 3 of the EDSPM and is now in Appendix H of the SDC), and roof mounted equipment.

(D) Treatment Standard Criteria – Stipulates that a Type 2 application process is required when the Alternative Treatment Standard is proposed. Identifies the site constraints that may demonstrate technical infeasibility necessitating the use of an Alternative Treatment Standard. Stipulates that all development must retain rainfall onsite to the maximum extent practicable and any rainfall not retained onsite, must treat up to the first one and four tenths inches (1.4") to achieve no less than 80% removal of total suspended solids. All stormwater not retained onsite must be discharged to the public stormwater system. Requires that structural stormwater controls used to meet the Treatment Standard incorporate Low Impact Development.

(E) Stormwater Study Standards – Clarifies that a Stormwater Study is required for any development that installs a structural stormwater control as defined in SDC 4.3.110(B) above. The Study must detail how the proposed stormwater control targets natural surface or predevelopment hydrologic function and provide a hydrological study.

(F) Stormwater Study Types – Amends the stormwater study types to be either a Small Site Study or a Full Site Study (a Mid-Level Site Study will no longer be an option). A Small Site Stormwater Study is permitted when a site is less than 1 acre, meets the site performance standards, and does not contain or abuts a floodplain/floodway, locally significant natural resource area, wetland, or riparian area; or Water Quality Limited Watercourse. For sites that cannot meet these standards, a Full Site Study is required.

(G) Stormwater Study Hydrologic Calculation Standards – Amends the stormwater study hydrologic calculation standards for a small site stormwater study or a full site study. For a small site study, the calculations must demonstrate compliance with the Site Performance Standard (calculations must use a value of 1.4" over 24 hours) or the Treatment Standard (calculations must use an intensity of at least 0.13 in/hr for off-line facilities and 0.22 in/hr for online facilities) and be supported by the methods and calculators in Chapter 4 of the Engineering Manual. For a full site study, the calculations must be supported by calculations using the unit hydrograph method and the storm event frequencies in Table 4.3.1.

(H) Operations and Maintenance Requirements – The Operations and Maintenance Requirements in the Engineering Manual were added to the code to ensure that all structural controls installed are operated and maintained to meet site performance or alternative treatment standards.

7. Water Quality Protection – Amended to move SDC 4.3.110(6) Identification of Water Quality Limited Watercourses and SDC 4.3.110(7) Protection of Riparian Area Functions to this section for clarity and consistency. Clarification was provided to require site design, landscaping, and drainage management practices to protect, preserve, and restore riparian area functions – see 4.3.115.

8. Landscaping – Amended to add vegetated stormwater facilities in landscaping requirements. SDC 4.4.105 clarifies that Low Impact Development is a landscaping requirement and must be landscaped to comply with SDC 4.3.110(C) for review under the Treatment Standard. Where parking lot planting areas are required, Low Impact Development and vegetated structural stormwater controls may be used to meet the planting requirement – see 4.4.105.

9. Motor Vehicle Parking – Parking Lot Improvements – Amended to allow curb cuts to allow runoff from parking lots to stormwater quality facilities – see 4.6.120.

10. Site Plan Review – Applicability – Amended to require Site Plan Review for stormwater management improvements or additions and expansions of impervious areas.

11. Definitions – Added stormwater terms to to SDC 6.1.110.

12. Appendices – See Appendices at the end of the Code

(A) Appendix A: Glenwood Refinement Plan Policies and Implementation Strategies – Phase 1 – Includes Chapters, policies, and implementation strategies that apply to the Glenwood Riverfront Mixed-Use Plan.

NOTE: this appendix will not be amended with this development code amendment. The “Appendix” will now be “Appendix A”.

(B) Appendix B: Santa Barbara Urban Hydrograph Method – Provides a hydrologic model for stormwater facilities for sites that are not suitable for a small site study.

(C) Appendix C: Infiltration Testing – Describes the approved standard filtration testing specifications for stormwater facilities in Springfield.

(D) Appendix D: Typical Stormwater Facility Details – Contains the most commonly used stormwater treatment facilities.

(E) Appendix E: Operations and Maintenance – Contains the required operations and maintenance forms and requirements for the long-term maintenance of required stormwater treatment facilities.

Contains the following forms:

- Stormwater Management Facility Inspection and Maintenance Log
- Facility Specific Operations and Maintenance Plans

(F) Appendix F: Approved Vegetation List – Contains a list of approved plants and where the plants should be located in stormwater facilities.

(G) Appendix G: Approved Street Trees – Contains a list of trees based on planting area size for the various species of trees approved for Springfield's streets.

(H) Appendix H: Onsite Source Controls – Contains the specific requirements for stormwater management and isolation for high-risk activity areas.

Legislative Version of Proposed Amendments to the Engineering Design Standards and Procedures Manual Chapter 3 Stormwater Quality to Incorporate MS4 Permit Requirements

PROPOSED AMENDMENTS
Various Sections of the Engineering Manual (EDSPM) are amended to remove barriers to Low-Impact Development and define stormwater terms. Commentary is shown in *purple italics font*, preceding the text to which it is referring.

EDSPM – CHAPTER 3
STORMWATER QUALITY

COMMENTARY: Chapter 3 of the Engineering Manual is no longer in the EDSPM. The following sections are part of the Springfield Development Code (SDC) or moved to other portions of the EDSPM.

- ***3.01 Stormwater Quality Design Standards:*** *Moved to SDC 4.3.110.*
- ***3.02 Stormwater Quality Design Criteria:*** *Moved to SDC 4.3.110.*
- ***3.02.1 Stormwater Quality Design Storm:*** *Moved to SDC 4.3.110, updated to use more modern data from the Eugene Airport weather station, matches the current design storms from the City of Eugene (same data from the same station).*
- ***3.02.2 Retention/Protection/Preference for Open Watercourses and Water Bodies:*** *Moved to 4.3.115.*
- ***3.02.3 Stormwater Quality Pollutants of Concern:*** *Included in SDC 4.3.110.*
- ***3.02.3.A Temperature Standard:*** *Moved to SDC 4.3.110, to be achieved primarily by infiltration and then shading if infiltration is not possible.*
- ***3.02.3.B Bacteria and Mercury Standards:*** *Is addressed in SDC 4.3.110 using "maximum extent practicable" for development that is using the treatment standard (e.g. not infiltrating all runoff). The municipal code also provides a pathway to require additional BMPs at any time if there is actual illicit discharge occurring that results in a bacteria or mercury issue for a property that uses the site performance standard instead.*
- ***3.02.3.C Total Suspended Solids (TSS) Standard:*** *This section has been integrated into SDC 4.3.110(C). Other information cited in this section is state law and does not need to be adopted or codified by Springfield.*
- ***3.02.3.D DEQ Stormwater Discharge Benchmarks:*** *This section is added to SDC 4.3.110(C).*
- ***3.02.4 Special Considerations for Higher-Risk Activities:*** *This section was replaced with Appendix H of the SDC for on site source controls.*
- ***3.02.4.A Eugene Stormwater Management Manual, Chapter 3:*** *The Stormwater Source Controls were moved to Appendix H of the SDC.*

- ***3.02.4.B Underground Injection Control (UIC):*** *Covered in SDC Appendix D Typical Stormwater Facility Details or EDSPM Chapter 4 Stormwater.*

- ***3.02.4.C Roof-mounted Equipment:*** *No longer necessary. This section is covered by DEQ rules for UIC's by requiring treatment before discharge to a UIC for any nonresidential roof.*

- ***3.02.4.D Drinking Water Protection (DWP) Overlay District:*** *This is a development standard and therefore belongs in the development code. Any Time of Travel related standards need to be in the DWP Overlay section. This section is otherwise duplicative of SDC 3.3.200 DWP Overlay District and is removed from the EDSPM.*

- ***3.02.5 Parking Lots/Paved Areas:*** *No longer necessary as the site treatment standard in SDC 4.3.110 requires treatment for all impervious parking lots.*

- ***3.02.6 Vegetative Treatment Requirements*****:** *Vegetative treatment requirements are incorporated into SDC 4.3.110(C) and (D) and will be adopted in Appendix F of the SDC. This section is removed from the EDSPM.*

- ***3.02.7 Parking Lot Maintenance:*** *Moved to EDSPM Chapter 4 as an advisory section.*

- ***3.03 Private Stormwater Maintenance Requirements:*** *Moved to SDC 4.3.110.*

- ***3.03.1 Operations and Maintenance Plan Submittal for Privately Maintained Facilities:*** *O&M mandatory requirements are in SDC 4.3.110 or included in Appendix E to the Development Code.*

- ***3.03.2 Specific Requirements of the O & M Plan:*** *Moved to SDC 4.3.110.*

Legislative Version of Proposed Amendments to the Engineering Design Standards and Procedures Manual Chapter 4 Stormwater to Incorporate MS4 Permit Requirements

PROPOSED AMENDMENTS
Various Sections of the Engineering Manual (EDSPM) are amended to remove barriers to Low-Impact Development and define stormwater terms. Commentary is shown in *purple italics font*, preceding the text to which it is referring.

CHAPTER 4 -
STORMWATER ~~CAPACITY~~

4.00 DESIGN STANDARDS

4.01 PURPOSE

The purpose of the Stormwater Capacity Design Standards is to provide a consistent policy under which certain physical aspects of stormwater conveyance design will be implemented. These standards have the objective of developing a stormwater conveyance system that ~~shall~~must:

A. Be consistent with the most current stormwater studies, master plans, and discharge permits for Springfield, the Springfield Development Code (SDC), APWA standard construction specifications, City of Springfield standard construction details and other Chapters of this Manual;

B. Be of adequate design to safely manage all volumes of water generated upstream and on the site to an approved point of discharge;

C. Provide conveyance for stormwater generated by future development upstream;

D. Prevent the uncontrolled or irresponsible discharge of stormwater onto adjoining public or private property;

E. Prevent the capacity of downstream channels and stormwater management facilities from being exceeded;

F. Have sufficient structural strength to resist erosion and all external loads that may be imposed;

G. Avoid impacts to stream water quality and quantity, and seek to maintain the historic hydrograph, including peak and base flows;

H. Maximize efficient use of Springfield's natural drainage systems and wetlands;

I. Require groundwater recharge wherever possible by utilizing stormwater management techniques that decrease im~~pervious~~permeable surfaces and increase infiltration to manage stormwater runoff;

J. Promote the protection of the Springfield's existing high level of overall water quality

and facilitate implementation of further water quality improvements;

K. Be designed in a manner and use materials that allow economical maintenance;

L. Be designed using methods and materials to insure a minimum practical design life of 75 years for all systems and 100+ years in traveled right-of-way; and

M. Be designed based on future land use.

4.02 GENERAL DESIGN CONSIDERATIONS

Stormwater system design within a development site ~~shall~~must include provisions to address water quality ~~concerns (see Chapter 3),~~ and the collection and conveyance of runoff from all public and private ~~streets, sidewalks, and driveways, and from the roof, footing, and area drains of all structures~~impermeable ~~areas~~surfaces. Furthermore, the design ~~shall~~must provide for the future extension of the stormwater system to the entire drainage basin in conformance with current adopted stormwater master plans or approved modifications to those plans.

All stormwater system designs ~~shall~~must be based upon the requirements in Springfield Development Code 4.3.110, which requires ~~on~~ an engineering analysis that takes into consideration water quality issues, infiltration capacity on-site, existing runoff rates and discharge points onto neighboring properties, pipe flow capacity, ~~hydraulic grade line, soil characteristics, pipe strength,~~ conflict with existing or proposed utilities, and potential construction problems.

In all locations ~~where stormwater infrastructure is not available, or where suitable subsurface conditions exist, for~~ of new or redevelopment the primary method for stormwater management will ~~be utilizing~~ utilize ~~a~~ Low Impact Development Approaches (LIDA), discussed in more detail in Section 4.17. ~~In locations where LIDA is not possible the stormwater system will provide quality treatment prior to discharge per the requirements in Chapter 3 and 4 of the EDSPM.~~

4.03 ACCOUNTABILITY FOR STORMWATER SYSTEM DESIGN

This Chapter presents Springfield's standards for engineering and design of stormwater system facilities. While Springfield believes these standards are appropriate for a wide range of development proposals, compliance solely with these requirements does not relieve the professional engineer of their responsibility to ensure stormwater facilities are engineered to provide adequate protection for public and private property and natural resources.

To assist applicants in preparing a Stormwater Study, Springfield has developed a Stormwater Scoping Sheet to ensure that site stormwater system design is prepared in compliance with this Manual and the Springfield Development Code. The ~~Stormwater Scoping Sheet~~ Stormwater Management System Scope of Work must~~shall~~ be completed for each development and can be found ~~at http://www.springfield-or.gov/dept_dpw.htm~~ on the City's website.

Other agencies may require some form of stormwater system review and impose requirements that are separate from, and in addition to, Springfield's requirements. The applicant must coordinate with these agencies and resolve any conflicts or concerns in stormwater conveyance and water quality requirements.

COMMENTARY: *All the stormwater study types, design storms and related stormwater treatment requirements are moved to the Springfield Development Code. There are now two different study types reduced from three: a small site and full site study. The small site can use the rational*

method and safe harbor calculators provided with this chapter of the EDSPM as appendices, that are sourced from the City of Eugene. The design storms were revised using more modern data from the weather station at the Eugene airport and that now matches those used by the City of Eugene.

~~4.03.1~~ **~~Stormwater Study~~**

~~All developments that will increase or modify impervious surface shall submit, if further study is not required by the criteria outlined below, a Stormwater Study and a plan for the development site that provides for a system capacity design for a 2-year storm event. The time of concentration for the study shall be determined by using a ten minute start time and calculated travel times in gutters, pipes and swales for each drainage basin on the development site. The stormwater system design shall be checked for overflow impacts that may occur in the 25-year storm event and include contingency measures to protect both on-site buildings and abutting properties.~~

~~A complete Stormwater Study, as outlined below, shall be submitted for all developments that generate public and/or private stormwater runoff from more than one (1) acre of land or create or modify more than 5000 sf of impervious area. Developments or redevelopments that drain into or modify an existing stormwater system with capacity of 0.5 cfs or greater shall also submit a complete Stormwater Study. Note: an Oregon licensed Civil Engineer shall prepare the complete Stormwater Study. All developments containing or adjacent to a floodplain, stream, wetland, natural resource area, or wellhead protection zone shall review and report their impact to those systems as part of the required Stormwater Study.~~

~~If required by the criteria stated above, a complete Stormwater Study shall be provided for a development that is proposed within Springfield's planning jurisdiction. This study shall include the following:~~

~~A.~~ ~~A written narrative describing the proposed stormwater system in detail, including connections to the public system, a description addressing water quality measures (Best Management Practices) proposed, as well asany necessary capacity measures that may be required for development (i.e. a detention pond). .~~

~~B.~~ ~~A hydrological study map, that shall contain:~~

1. ~~The development site and adjacent areas that contribute significant offsite flows, well defined, and an appropriate amount of area beyond the development site of not less than 100 feet;~~

2. ~~Streets important to the study, and street names;~~

3. ~~Flow arrows in streets and ditches;~~

4. ~~Contours or spot elevations for verification of direction of overland flow and pipe cover; Contour intervals on the study map shall be as follows:~~

~~Slope (%)~~	~~Contour Interval (Feet)~~
~~0 - 10~~	~~1~~
~~11 - 25~~	~~2~~
~~> 25~~	~~10~~

5. ~~Drainage areas of all sub-basins (in acres);~~

6. ~~Collection points (nodes) at downstream limits of all sub-basins;~~

7. ~~A profile of the stormwater system showing invert elevations, manhole top and bottom elevations, existing utilities, and existing and finished ground line elevations;~~

8. ~~Existing and proposed stormwater pipes and channels with sizes and/or cross-sections included;~~

9. ~~Future pipes in the system, complete with proposed sizes, slopes, pipe cover, flow line elevations at manholes, etc.;~~

10. ~~North arrow, scale, company name and logo, designer, date, etc.;~~

11. ~~Environmentally sensitive areas (e.g. gullies, ravines, swales, wetlands, steep slopes, springs, creeks, etc.) For natural drainage features show direction of flow; and~~

12. ~~100-year flood plain with flood elevations and 100-year flood way, as applicable.~~

C. ~~Hydrologic calculations to establish runoff volumes (see analysis method requirements and design event in the Sections 4.03.2).~~

D. ~~Hydraulic calculations to establish pipe size, flow velocity, hydraulic grade line, etc.~~

~~Unless specifically required by Springfield for a particular development, land use applications will not be required to provide engineering level details for on-site pipe profiles (showing invert elevations, manhole top and bottom elevations, pipe cover, etc) as part of application. However, these details shall be required prior to final development approval.~~

~~4.03.2~~ **~~Stormwater Study Types~~**

A. ~~A Small Site Stormwater Study shall be required when ALL of the following criteria are met:~~

1. ~~The study area is less than five (5) acres in size.~~

2. ~~The study area drains into an established public system with available capacity for the peak flow based on the storm event frequency required under Section 4.03.4 Hydrologic Calculations.~~

3. ~~For sites using a Low Impact Design Approach, a soils study may be required to ensure the site soils are suitable for the proposed stormwater management facilities.~~

4. ~~The development proposed is a residential development. Commercial and industrial developments may also qualify for a Small Site Stormwater Study, provided the proposed development site is less than 1 acre.~~

5. ~~The study area does not contain and is not adjacent to a floodplain, stream, wetland, natural resource area, or well head protection zone.~~

B. ~~A Full Site Stormwater Study shall be required when the criteria for a Small Site~~

Stormwater Study cannot be met and where ANY of the following conditions are met:

1. The study area is greater than 25 acres in size.

2. Developments that require creation of a new outfall and/or exceed existing system capacity and require an offsite capacity analysis for approval.

3. The study area that contains or is adjacent to a floodplain, stream, wetland, or natural resource area.

4. Any development that does not qualify for a Small Site of Mid-Level Site Stormwater Study and that either generates a peak flow in excess of 0.5 cfs, or modifies a stormwater system with a capacity of 0.5 cfs or greater, or is a redevelopment or development that creates 5,000 square feet or more of new impervious area.

4.03.3 Hydrologic Calculations

Hydrologic calculations for the various study types shall conform to the following:

A. Small Site Stormwater Study:

1. Rational peak flow method1 .

1 When the 'C' factor in rational method peak flow analysis is 0.5 or greater, the time of concentration / flow time and the peak flow from the impervious areas shall be computed separately and compared to the combined area. The higher of the two peak flow rates shall then be used to size the conveyance.

2. 2-year storm event frequency for volumes up to 5 cfs.

3. 5-year storm event frequency for volumes from 5 cfs to 20 cfs.

B. Mid-Level Site Stormwater Study:

1. Unit Hydrograph Method. Use SCS Type 1A distribution for rainfall (values given below).
2. Storm events and volumes same as Small Site and using the 10-year event for volumes of 20 cfs to 40 cfs.
3. 25-year storm event for detention facilities where necessary to meet downstream capacity issues.
4. 50-year storm event for volumes above 40 cfs.

C. C. Full Site Stormwater Study:

1. Unit Hydrograph Method. Use SCS Type 1A distribution for rainfall (values given below).

2. Floodplain analysis if development affects a floodplain.

3. Storm events and volumes same as outlined in Small and Mid-Level above and 100- year flood for areas in the floodplain.

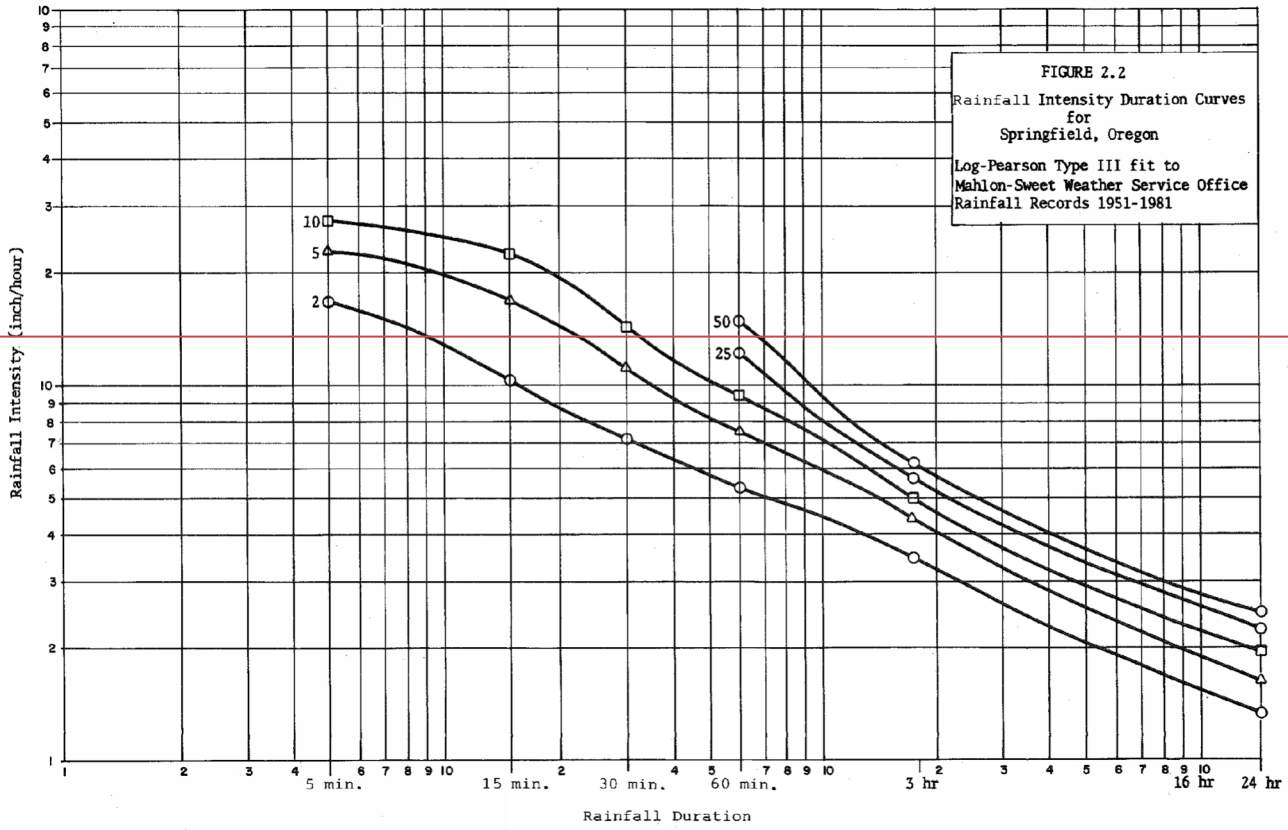
Based on the Springfield Stormwater Facilities Master Plan (2008) and the Portland Stormwater Management Manual (2008), the following represents the SCS Type 1A design rainfall depths that shall be used for Unit Hydrograph calculations for the following 24-hour duration storm events:

Storm Event	Rainfall
Water Quality Event	0.83 Inches

2 Year	3.3 Inches
5 Year	3.8 Inches
10 Year	4.3 Inches
25 Year	4.8 Inches
100 Year	5.2 Inches

When utilizing the rational method, the Intensity Duration Frequency curves from the West Springfield Drainage Master Plan (1983) located below shall be used for design. An intensity of 1/4 inch per hour shall be used for the water quality storm event as specified in Chapter 3.

When utilizing the rational method, the Intensity Duration Frequency curves from the *West Springfield Drainage Master Plan* (1983) located below shall be used for design. An intensity of 1/4 inch per hour shall be used for the water quality storm event as specified in Chapter 3.



4.03.4 Hydraulic Calculations

A. The method of hydraulic calculations shall be subject to City Engineer approval.

B. Site development improvement projects shall address on-site and off-site stormwater management concerns, both upstream and downstream of a project, including but not limited to:

1. Modifications to the existing on-site stormwater management facilities shall not restrict flows creating backwater onto off-site property to levels greater than the existing situation unless approved by the affected off-site property owners and Springfield. The affected property owner(s) shall agree to and sign an easement identifying the location of the backwater storage. The easement shall be in a form approved by the City Engineer.

2. Stormwater management facilities shall be designed and constructed to accommodate all flows generated from upstream property from the most recent approved land use plan at full development.

3. The design of stormwater management facilities shall analyze the impact of restrictions downstream of the project site. The developer shall remove downstream restrictions that create on-site backwater or the on-site backwater shall be addressed in the design of the development's storm system. The removal of downstream obstructions shall not be allowed if this removal creates downstream capacity problems.

C. Review of Downstream System:

1. The design engineer for each development constructing new impervious surface of more than 5,000 square feet shall submit documentation, for review by the City Engineer, of the downstream capacity of any existing storm facilities impacted by the proposed development. The design engineer shall perform an analysis of the stormwater system downstream of the development to a point in the stormwater system where the proposed development site constitutes 10 percent or less of the total tributary drainage volume, but in no event less that 1/4 mile.

2. If the capacity of any downstream public storm conveyance system or culvert is surpassed during the Event/CFS level requirements, due directly to the development, the developer shall correct (mitigate) the capacity problem or construct an on-site detention facility unless approved otherwise by the City Engineer.

3. If the projected increase in surface water runoff that will leave a proposed development will cause or contribute to damage from flooding to existing buildings or dwellings, the downstream stormwater system shall be enlarged to relieve the identified flooding condition prior to development, or the developer shall construct an on-site detention facility.

4. Any increase in downstream flow shall be reviewed for erosion potential, defined as downstream channels, ravines, or slopes with evidence of erosion/incision sufficient to pose a sedimentation hazard to downstream conveyance systems or pose a landslide hazard by undercutting adjacent steep slopes.

4.03.5 Design of Conveyance

The conveyance system shall be designed to convey and contain at least the peak runoff for the Event/CFS design requirements. Structures for proposed pipe systems shall provide a minimum of 1 foot of freeboard between the hydraulic grade line and the top of the structure or finish grade above pipe for a 25-year peak rate of runoff. Surcharge in pipe systems shall not be allowed if it will cause flooding in portions of a habitable structure, including below-floor crawl spaces. All public pipes shall be laid at a positive slope, and no system shall be designed to be permanently surcharged.

The following conditions may cause the City Engineer to require hydraulic designs to include an overland conveyance component demonstrating how a 100-year event will be accommodated. This overland component shall not be allowed to flow through or inundate an existing building.

1. Discharges to an already overloaded portion of the stormwater network, as

~~determined by the Springfield *Stormwater Facilities Master Plan*;~~

~~2. Additional discharges to overloaded or surcharged conveyances where overflows may cause significant property damage; or~~

~~3. Where failure of on-site treatment and infiltration stormwater systems could lead to flooding of adjacent or on-site structures.~~

4.04 DESIGN OF STORMWATER SYSTEMS

A. Manhole Design:

1. Manholes ~~shall~~must be provided at least every 500 feet, at every grade change, and at every change in alignment and junction of 2 or more lines. Manhole lids ~~shall~~must have a minimum of 6 inches of clearance from the edge of a curb or gutter and ~~shall~~must not be in a wheel path of the traveled way.

2. All manholes ~~shall~~must be a minimum of 4~~2~~8 inches in diameter.

3. Pipe crowns of branch or trunk lines entering and exiting junctions ~~shall~~must be at the same elevation. If a lateral is placed so its flow is directed against the main flow through the manhole or catch basin, the lateral invert ~~shall~~must be raised to match the crown of the mainline pipe.

4. Manholes on a sealed joint system (tight line) and all stormwater systems on slopes greater than 10 percent ~~shall~~must be constructed with a 20-foot, parallel perforated line to collect ground and trench water into the system.

5. Inside drop structures ~~shall provide a minimum of 42 inches of clear space~~ are not allowed. A manhole may have a free inside drop of up to 2 feet.

6. All manholes ~~shall~~must have a minimum 12-inch ledge on 1 side of the channel in the base at an elevation of 0.8 of pipe height, except for water quality manholes.

7. Details of pipe configuration and flow channelization ~~shall~~must be submitted with the plans where pipes into or out of a manhole are larger than 24 inches, or where more than 3 ~~4~~ mainline connections are made.

8. Connections to an existing manhole, elevation of the existing ledge, and elevations of existing inlets and outlets ~~shall~~must be submitted with the plans.

9. Connections are allowed directly into a manhole if the manhole is properly channelized. No more than 3 side laterals (maximum number of penetrations must not exceed 4) ~~shall~~must be connected to a manhole unless otherwise approved by the City Engineer. There ~~shall~~must be a minimum of 8 inches separating connections as measured from the outside diameter of the pipe.

~~10. A manhole may have a free inside drop of up to 2 feet.~~

~~11. Line manholes may be 'T' top design for pipe diameters 42 inches and larger where no side line connections are present or planned.~~

B. Water Quality Manholes/Structures:

1. Water quality manholes or structures ~~shall~~must be an approved, manufactured unit. All capacity, efficiency, and operations and maintenance ~~data~~ plans ~~shall~~must be submitted at the time of plan review.

2. Each water quality manhole~~s~~ or structure~~s~~ ~~shall~~must be designed for the runoff from the upstream watershed at build out, based on the applicable comprehensive land use plan. No flow ~~shall~~may be introduced into the manhole or structure in addition to the design amount.

3. Water quality manholes ~~shall~~must be a minimum of 60 inches in diameter, unless otherwise approved by the City Engineer.

4. Water quality manholes ~~shall~~must not be used in a submerged or surcharged system. The manufacturer's required head losses ~~shall~~must be accommodated for in the system design.

5. Water quality structures and water quality catch basins ~~shall~~must meet the requirements of current Stormwater Quality Standards as specified in Springfield Development Code 4.3.110 (C) & (D).

C. Pipe Type:

1. Concrete pipe – standard pipe material for stormwater system design within Springfield. Refer to the ~~Springfield~~ APWA Standard Construction Specifications for pipe bedding details.

2. PVC – ~~may be used in areas that meet criteria for Hillside Development as specified in Chapter 7, where tight-line or sealed systems are required, or areas located outside of the right-of-way. Pipe loading analysis calculations may be required on a case-by-case basis~~ standard pipe material for stormwater design within Springfield. Must use factory (manufactured) fittings suitable for the PVC type required. All PVC pipe with less than 3' of cover from top of finished pavement must be C900 type.

3. HDPE with manufactured fittings – may be used in all areas that meet manufacturer's installation requirements when approved by the City Engineer. Pipe loading analysis may be required on a case-by-case basis.

4. Ductile iron – may be used when sufficient depth of cover over the pipe is not available for the above pipe types due to existing topographic demands and conflicting site and building code requirements.

D. Pipe Size:

1. Pipe from an inlet to the main line in the public system ~~shall~~must be a minimum of 10 inches in diameter.

2. Main line pipe ~~shall~~must be a minimum of 12 inches in diameter.

3. Service laterals for single-family residences ~~shall~~must be 6 inches in diameter. All other service laterals ~~shall~~must be a minimum of 10 inches in diameter.

E. Minimum and Maximum Velocities:

1. All storm pipes ~~shall~~must achieve a minimum velocity of 3 feet per second at 0.5

part full based upon Table 4-1 and the associated 'n' value.

2. All pipe exceeding critical flow velocities ~~shall~~must have analysis data submitted showing the effects of hydraulic jump at manholes and downstream water levels for peak flow situations.

Table 4-1: Manning's 'n' Values for Pipes

~~Type of Pipe Material~~	~~Uniform Flow (Preliminary Design)~~	~~Backwater Flow (Capacity Verification)~~
~~Concrete Pipe and Lined Corrugated PE Pipe~~	~~0.014~~	~~0.012~~
~~Annular Corrugated Metal Pipe~~		
• ~~2-2/3 inch X ½ inch Plain or Fully Coated~~	~~0.028~~	~~0.024~~
• ~~Paved Invert~~	~~0.021~~	~~0.018~~
• ~~3 inch X 1 inch Corrugation~~	~~0.031~~	~~0.027~~
• ~~6 inch X 2 inch Corrugation (Field Bolted)~~	~~0.035~~	~~0.030~~
~~Helical 2-2/3 inch X 1/2 inch Corrugation and Corrugated PE Pipe~~	~~0.028~~	~~0.024~~
~~Spiral Rib Metal Pipe and PVC Pipe~~	~~0.013~~	~~0.011~~
~~Ductile Iron Pipe Cement Lined~~	~~0.014~~	~~0.012~~
~~Solid Wall PE Pipe (Butt Fused Only)~~	~~0.009~~	~~0.009~~

Type of Pipe Material	For design and capacity analysis
• Concrete Pipe / Box Culverts	0.013
• PVC Pipe	0.009
• Ductile Iron Pipe Cement Lined	0.014
• Helical Corrugated HDPE Pipe	0.024
• Solid Wall HDPE Pipe	0.009

F. Pipe Location:

1. All public stormwater pipes ~~shall~~must be located within the public right-of-way or City owned stormwater treatment facilities. The stormwater line must not be closer than 5 feet to the edge of public right of way. The City Engineer may grant exceptions for systems with physical constraints precluding the location within the public right-of-way such as shared access easements.

~~2. Stormwater pipes shall not be located closer than 10 feet from the edge of a public street right-of-way.~~

~~3.~~ 2. Stormwater pipes in easements ~~shall~~must be located in the center of the easement unless otherwise approved by the City Engineer. The centerline of a stormwater pipe ~~shall~~must not be located closer than 7 feet to ~~an easement side line~~ the edge of

the easement. Minimum easement size must be ½ of the pipe's diameter plus 14 feet.

~~4.~~ 3. Stormwater pipes must be located so that manholes are not in the wheel path.

~~5.~~ 4. Stormwater laterals ~~shall~~must be provided on the down slope side of all lots in developments where gravity drainage to the street or other approved discharge location cannot be provided.

~~6.~~ 5. The crowns (inside tops) of pipes ~~shall~~must match wherever practical when changing pipe sizes at manholes.

G. Distance between Structures:

1. The maximum length of pipe between stormwater structures ~~shall~~must be 500 feet for all systems with pipe 24 inches and smaller. Larger diameter pipe systems ~~shall~~must not exceed 600 feet between structures.

H. Alignment:

1. Pipe ~~shall~~must be laid on a straight alignment and at a uniform grade rate from structure to structure except as provided for in the Hillside Overlay District as specified in Chapter 7 and SDC 3.3-500.

I. Pipe Cover:

1. Pipe cover ~~shall~~must be measured from the finished ground elevation to the top of the outside surface of the pipe in areas outside paved areas. In paved areas, the pipe cover ~~shall~~must be measured from the lowest point of the gutter section to the top outside surface of the pipe.

2. The minimum pipe cover ~~shall~~must be 18 inches for concrete reinforced pipe and 36 inches for plain concrete and plastic pipe materials or per the manufacturer's requirement for the proposed materials. ~~An engineered solution may be accepted for pipe not able to meet these conditions.~~

3. ~~In flat drainage basins, the design engineer shall demonstrate that the stormwater pipe has been laid at a depth sufficient to properly drain the remainder of the upstream tributary area.~~

J. ~~Tight-line (~~A~~a~~ sealed pipe system~~) shall be used for conveyance systems traversing a slope that is steeper than 10 percent and greater than 20 feet in height. It shall also~~ must be required within sensitive areas or where contamination of either the ground water or the stormwater from contaminated ground areas is a particular concern.

G. Perforated pipe drain systems, ~~or 'French drains' shall be engineered and be approved by the City Engineer. Where perforated pipe systems are used to dispose of stormwater, they shall meet all requirements for an Underground Injection Control (UIC) system.~~ 'soakage trenches' or other UIC for public stormwater disposal are not allowed in the City of Springfield.

4.05 CATCH BASIN/INLET DESIGN

A. All inlet and catch basin openings ~~shall~~must be designed to accept flow from a 10 year storm event with gutter spread not to extend more than 3 feet into the adjacent roadway. Combination inlets with grates, where used, ~~shall~~must be of multi-chambered design, and ~~shall~~must be designed, as far as practical, to avoid failure due to accumulation of debris.

B. The standard ~~catch basin for use within Springfield shall be the curb inlet basin in the forms listed in the current issue of the Springfield Standard Specifications. Gutter catch basins may be used where conflicts dictate their use only if no on-street bike facilities are present or planned. Combination gutter/curb inlet basins shall be used where slopes and velocities allow by-pass of more the 15 percent of the design flow (HEC 12 method of determination), or for use in Hillside development (see Chapter 7)~~. curb inlet used is Springfield Standard Drawing 4-21 (double chambered curb inlet) or ODOT standard RD 371 and RD 372. The standard catch basin to be used is Springfield Standard Drawing 4-11 or ODOT standard Drawing RD 364. In areas where a combination inlet is necessary ODOT standard RD 366 is to be used. All grates used must be bike and pedestrian friendly (ODOT standard type 2).

C. All catch basins ~~shall~~must be constructed with an 18 inch sump.

D. A main stormwater line larger than 12 inches must ~~shall~~ not pass through a catch basin or inlet, unless approved ~~as a manhole inlet combination~~ by the City Engineer.

E. Flows in streets during the 2-year event ~~shall~~ must not run deeper than 4 inches against a curb or extend more than 3 feet into the adjacent travel lane (bicycle or vehicle). Streets classed as collector and above and streets in commercial areas ~~shall~~must meet the above requirements for the 10 year event. Inlets in sag locations ~~shall~~must be designed with no more than 6 inch depth of water (top of curb) above the gutter flow line during the 25-year event.

F. A catch basin ~~shall~~must be provided just upslope to curb returns or ADA ramps if present on streets with a centerline gradient of 3 percent or more ~~and~~ or a street gutter flow run of 100 feet or more.

G. Catch basins may connect to main stormwater lines with a manufactured tee connection when the main stormwater line is at least 1 size larger that the catch basin line. An Insert-A-Tee may be used when the catch basin line is ½ or smaller of the diameter of the main line. When the catch basin line is the same size as the main stormwater line, the connections ~~shall~~must be made at a manhole or other approved structure. The maximum length of pipeline between the catch basin and the mainline ~~shall~~must be 40 feet for 10 inch pipe and 60 feet for 12 inch pipe. ~~Oversize catch basins (30 inch inside dimention) shall be installed when a tee connection is used.~~

4.06 AREA DRAINS AND DITCH INLETS

A. The standard area drain ~~shall~~must be as shown in Springfield Standard Drawing No. 4-11 and 4-12 ~~Ditch inlets shall be shown in Standard Drawings No. 4-13 and 4-14 with 12-inch sumps and 10 inch minimum outlet size.~~ or ODOT standard drawings RD 364 and RD 368 for area drains, and RD 370 may be used for ditch inlets.

B. A main stormwater line ~~shall~~must not pass through a field inlet or ditch inlet.

~~C.~~ Ditch inlets ~~shall~~ can be located at the upper terminus of a main stormwater line ~~or shall connect to a main stormwater line only at a manhole~~.

4.07 CONSTRUCTED CHANNELS

A. When constructed channels are used or modified, they ~~shall~~must be lined with vegetation whenever possible. The proposed vegetation will require a planting plan as part of site plan/building plan approval.

B. Rock-lined channels ~~shall~~must only be used where a vegetative lining will not provide adequate protection from ~~erosive velocities~~ erosion per Table 4-2.

C. Channel Design:

1. Constructed open channels ~~shall~~must be sized to pass the required flows and have side slopes no steeper than 2:1. Any proposed constructed channel improvement that does not meet these requirements may be required to be piped by the City Engineer.

2. Channels designed to handle the runoff from a development ~~shall~~must be constructed from the development to an existing public stormwater system with an established outfall to a receiving waterway.

3. Channels ~~shall~~must not contain protruding pipes, culverts or other structures that reduce or hinder the flow characteristics of the channel, except for structures that are required and designed to dissipate velocities. Channels ~~shall~~must be designed to prevent scouring and erosion. All pipes will be provided with protection per ODOT standard detail RD317.

4. Channel protection ~~shall~~must be as shown in Table 4-2.

D. Access – Maintenance:

1. Access roads or other suitable access ways for maintenance purposes ~~shall~~must be provided when ~~channels~~ surface water systems do not ~~abut~~ border public right-of-way with a suitable road. Access ~~shall~~must be provided along ~~1~~ one side of the ~~channel~~ system as necessary for vehicular maintenance access.

2. Access roads ~~shall~~must have a maximum grade of 15 percent, and a maximum cross slope of 3 percent.

3. A turnaround with 40-foot minimum outside turning radius ~~shall~~must be provided on the access road or access provided at both ends to the public right of way.

4. Access roads ~~shall~~must be a minimum of 15 feet wide on curved sections and 12 feet on straight sections.

5. Access roads in excess of 50 feet in length ~~shall~~must have a turnaround unless approved by the City Engineer.

6. Access roads ~~shall~~must have the capability of supporting a 20-ton vehicle under all weather conditions.

7. The first 18 feet of access roads must be paved with a durable, dust free top course past the edge of the road or sidewalk. Past the first 18 feet access roads

will be surfaced with an all-weather top course, with preference given to permeable materials such as grass pave or permeable concrete.

Table 4-2: Channel Protection for Channel Construction

Greater Than (FPS)	Less Than or Equal to (FPS)	Required Protection	Thickness	Min. Height Above Design Water Surface
0	5	Vegetation Lining	N/A	0.5 ft.
5	8	Riprap Class 50	1 ft.	1 ft.
8	12	Riprap Class 100 with check dams	2 ft.	2 ft.
12	20	Gabion or Velocity Dissipaters	Varies	2 ft.

4.07.1 Roadside Ditches

A. Existing or new roadside ditches ~~shall~~must be constructed with a maximum depth of 2 feet as measured from the shoulder of the road and a minimum depth of the adjacent road section (typically 16 inches for the City of Springfield standard road section).

B. Side slopes ~~shall~~must be 2H:1V or less.

C. The ditches must be vegetated with plants or seeds from Appendix F Approved Vegetation List in the Springfield Development Code.

~~C.~~ D. Velocity when flowing full ~~shall~~must not exceed the erosive velocity limits of the soil or lining in the ditch.

4.08 OUTFALLS

Outfalls ~~shall~~must conform to the requirements of all federal, state, and local regulations. Outfall design ~~shall~~must be based on considerations to protect the outfall area and channel from scour, sloughing and channel degradation rather than hydraulic efficiency. The design velocity from the outfall for its largest recurrence interval design storm ~~shall~~must be consistent with the velocity in the receiving channel for the same recurrence interval design storm as the outfall design storm. If the velocity from the outfall is greater than the velocity in the receiving channel, erosion protection and energy dissipation may be required. Installation of backflow prevention gates may be necessary when the outfall is in a tail-water condition.

A. Outfalls ~~shall~~must be placed above the mean low water level except as permitted by the City Engineer.

B. All outfalls ~~shall~~must be provided with a rock splash pad or other approved erosion control protection measures. Rock protection at outfalls ~~shall~~must be designed in accordance with the ~~Springfield Standards Specifications and Table 4-2 above~~ ODOT standard detail RD317 and Table 4-2 above. Mechanisms that reduce velocity prior to discharge from an outfall are encouraged and may be required. Examples are drop manholes and rapid expansion into pipes of much larger size.

C. An engineered energy dissipater, that may include stilling basins, drop pools, hydraulic jump basins, baffled aprons, or bucket aprons, ~~shall~~must be provided for outfalls with velocity at design flow greater than 10 FPS. These ~~shall~~must be designed using

published references such as *Hydraulic Design of Energy Dissipaters for Culverts and Channels* published by the Federal Highway Administration of the United States Department of Transportation, and others. Design reference ~~shall~~must be included on the construction plan submittal.

~~4.09 DOWNSTREAM PROTECTION REQUIREMENT~~

~~Each new development or redevelopment shall mitigate the impacts, on both the quantity and quality of stormwater, upon the public stormwater system. The development may be able to mitigate capacity impacts on the public stormwater system using the following techniques, subject to the limitations and requirements of this Manual and, approval by the City Engineer.~~

~~A. Constructing permanent on-site stormwater capacity detention facilities designed in accordance with current stormwater management practices.~~

~~B. Using Low Impact Design Approaches (LIDA) to minimize impervious surfaces and stormwater runoff increases.~~

~~C. Enlarging or improving the downstream conveyance system.~~

~~4.10 CRITERIA FOR ALLOWING DETENTION IN LIEU OF ON-SITE DETENTION~~

~~On-site detention facilities shall be constructed when any of the following conditions exist:~~

~~A. There is an identified downstream deficiency, and detention, rather than conveyance system enlargement, is determined to be the more effective solution.~~

~~B. There is an identified regional detention-site within the boundary of the development.~~

~~C. The need for pre-treatment of stormwater discharge dictates that flows be detained for water quality processes.~~

~~D. There is a need to mitigate flow impacts on receiving streams.~~

~~E. The development site is located in an area where on-site treatment and disposal using LIDA is required or considered desirable and feasible.~~

~~4.10.1 On-Site Detention Design Criteria~~

~~A. When required, on-site stormwater detention facilities shall be designed to capture runoff so the runoff rates from the site after development do not exceed the pre-development conditions, based upon a 2- through 25-year, 24-hour return storm. Volume and duration of pre-development conditions will be considered.~~

~~B. When required because of an identified downstream deficiency, on-site stormwater detention facilities shall be designed so that the peak runoff rates will not exceed pre-development rates for the specific range of storms that cause the downstream deficiency.~~

~~C. Construction of on-site detention shall not be allowed as an option if such a detention facility would have an adverse effect upon receiving waters in the basin or sub-basin in the event of flooding or would increase the likelihood or severity of flooding problems downstream of the site.~~

~~4.11 IMPERVIOUS AREA USED IN DESIGN~~

~~For single family and duplex residential subdivisions, stormwater capacity detention facilities shall be sized for all impervious areas created by the subdivision, including all streets, residences on individual lots at a rate of 2,640 square feet of impervious surface area per dwelling unit, and other impervious area. These facilities shall be constructed in conjunction with the subdivision's public improvements.~~

~~For all developments other than single family and duplex, the sizing of stormwater capacity detention facilities shall be based on the impervious area to be created by the development, including structures and all streets and impervious areas. Impervious surfaces shall be determined based upon building permits, construction plans, or other appropriate methods deemed reliable by the City Engineer.~~

~~4.12~~ 4.09 ~~DETENTION~~ STORMWATER TREATMENT ~~POND~~ FACILITY DESIGN

~~Detention ponds~~ Treatment ponds and other open impoundment facilities ~~such as landscape areas, open playing fields and parklands,~~ must be constructed to comply with the requirements of ORS 537, in general and more specifically~~.~~, ORS 537.400 Ponds and Reservoirs. All stormwater ~~detention~~ treatment ponds ~~shall~~must be designed by an Oregon licensed Civil Engineer and comply with the following ~~criteria~~ specifications:

A. Facility Geometrics:

1. Interior side slopes up to the maximum water surface ~~shall~~must be no steeper than ~~3~~2H:1V if an access ramp is available with slope less than 3H:1V and a fence is provided around the perimeter. If these are not provided the slopes ~~shall~~must be no steeper than 3H:1V. If the interior slope needs to be mowed, the slope ~~shall~~must be 4H:1V.

2. Exterior side slopes ~~shall~~must not be steeper than 2H:1V unless analyzed for stability by an Oregon licensed Geotechnical Engineer.

3. ~~Pond walls and/or dikes may be retaining walls, provided that the design is prepared and stamped by an Oregon licensed Civil Engineer; and a fence is provided along the top of the wall; and that at least 25 percent of the pond perimeter will be a vegetated soil slope of not greater than 3H:1V~~. A retaining wall can be used with City Engineer approval. An access ramp no steeper than 3H:1V must be provided and a fence provided around the perimeter of the retaining wall.

B. Water Quality Considerations:

1. ~~Pond bottoms shall be level, and located a minimum of 0.5 feet below the inlet and outlet to provide sediment storage.~~ Facility bottoms must be graded to drain to the outlet. Inlets to the facility must have a forebay to capture sediments. A perforated pipe underdrain will be provided to fully drain the pond if the soil the pond is constructed in does not have an infiltration rate in excess of 0.25 inches per hour as determined by an on-site infiltration test per Appendix D in the City of Springfield Development Code.

2. The inlet and outlet structures ~~should be on opposite ends of the pond to promote maximum residence time and to prevent short-circuiting~~ must be separated as much

as possible and still maintain positive slope from the inlets to the outlets of the pond to promote maximum residence time and to prevent short-circuiting. Baffles ~~may be installed~~ or a sinuous channel may be required to increase the residence time and flow path if locating outlet structures far enough apart is not practical ~~on opposite sides of the pond is not practical~~.

3. ~~Detention~~ Stormwater treatment facilities ~~shall~~must be designed so that the "drawdown" time does not exceed 48 hours. In the event drawdown time exceeds 48 hours, additional calculations ~~shall~~must be submitted showing the proposed facility can contain an additional 25-year, 24-hour return period storm.

4. The use of a sedimentation fore bay ~~shall~~must be required during the construction process if the pond is to be used for sedimentation control as determined by the Land Drainage and Alteration Permit. After construction is complete, the pond ~~shall~~must be completely cleaned and all sediment removed prior to ~~hook up to Springfield infrastructure~~ acceptance of the project or final site approval as a stormwater treatment structure.

C. Overflow: ~~- Emergency Spillway~~:

1. ~~A pond~~ An overflow system ~~shall~~must provide controlled discharge of the design storm event for developed contributing area without overtopping any part of the ~~pond~~ facility embankment or exceeding the capacity of the ~~emergency spillway~~ overflow. The design ~~shall~~must provide controlled discharge directly into the downstream conveyance system. An ~~emergency~~ overflow ~~spillway (secondary overflow)~~ ~~shall~~must be provided to safely pass the 100-year, 24-hour design storm event ~~over the pond embankment~~ before the pond embankment is overtopped in the event of control structure failure and for storm/runoff events exceeding design. The ~~emergency~~ overflow ~~spillway~~ ~~shall~~must be located to direct overflows safely towards the downstream conveyance system. The ~~emergency~~ overflow ~~spillway~~ ~~shall~~must be stabilized with riprap or other approved means and ~~shall~~must extend to the toe of each face of the berm embankment.

~~D. Access – Maintenance:~~

~~1. Pond access easements and roads shall be provided when ponds do not abut public right-of-way. Access roads shall provide access to the control structure and along 1 or both sides of the pond as necessary for vehicular maintenance access.~~

~~E. Access roads shall meet the criteria specified in Section 4.07 D.~~

~~F.~~ D. Berm Embankment - Slope Stabilization:

1. ~~Pond~~ Facility berm embankments higher than 6 feet ~~shall~~must be designed by an Oregon licensed Civil Engineer or Geotechnical Engineer. The berm embankment ~~shall~~must have a minimum 1~~5~~0 foot top width where necessary for maintenance access; otherwise, top width may vary as recommended by the design engineer, but in no case ~~shall~~may top width be less than 4 feet.

2. The toe of the exterior slope of ~~pond~~ facility berm embankment ~~shall~~must be no closer than 5 feet from the tract or easement property line.

3. The ~~pond~~ facility berm embankment ~~shall~~must be constructed on native

consolidated soil (or adequately compacted and stable fill soils analyzed by an Oregon licensed Geotechnical Engineer) free of loose surface soil materials, roots and other organic debris.

4. The ~~pond~~ facility berm embankments ~~shall~~must be constructed by excavating a 'key' equal to 50 percent of the berm embankment cross-sectional height and width or as designed by an Oregon licensed Geotechnical Engineer.

5. The berm embankment ~~shall~~must be constructed on compacted soil (95 percent minimum dry density, per AASHTO T99, placed in 6 inch lifts, with the following soil characteristics: a minimum of 30 percent clay, a maximum of 60 percent sand, a maximum of 60 percent silt, with nominal gravel content) or as designed by an Oregon licensed Geotechnical Engineer.

6. Anti-seepage collars ~~shall~~must be placed on pipes in berm embankments that impound water greater than 4 feet in depth at the design water surface.

7. Exposed earth on the ~~pond~~ facility bottom and side slopes ~~shall~~must be seeded with seed mixture or planted per an approved planting plan for the facility and approved by the City Engineer.

~~4.13 USE OF PARKING LOTS FOR DETENTION~~

~~Parking lots may be used to provide additional detention volume for runoff events greater than the 2-year runoff event provided that:~~

~~A. The depth of water detained shall not exceed 1 foot at any location in the parking lot for runoff events up to and including the 100-year event; AND~~

~~B. The gradient of the parking lot area subject to ponding shall be 1 percent or greater; AND~~

~~C. The emergency overflow path shall be identified and noted on the engineering plan, and comply with all other development and stormwater management requirements; AND~~

~~D. Fire lanes used for emergency equipment shall be free of ponding water for all runoff events up to and including the 100-year event.~~

~~4.14 USE OF ROOFS FOR DETENTION~~

~~Detention ponding on roofs of structures may be used to meet flow control requirements provided that:~~

~~A. All applicable provisions of the International Building Code are met or exceeded by the design; AND~~

~~B. The roof support structure shall be analyzed by an Oregon licensed Structural Engineer to address the weight of ponded water; AND~~

~~C. The roof area subject to ponding shall be sufficiently water-proofed to achieve a minimum service life of 30 years; AND~~

~~D. The minimum pitch of the roof area subject to ponding shall be 1/4 inch per foot, AND~~

~~E.~~ ~~An overflow system shall be included in the design to safely convey the 100-year peak flow from the roof; AND~~

~~F.~~ ~~A mechanism shall be included in the design to allow the ponding area to be drained for maintenance purposes or in the event the restrictor device is plugged.~~

~~4.15 UNDERGROUND DETENTION FACILITIES~~

~~Springfield's preference is to have stormwater runoff detention occur above ground. In select locations, the City Engineer may approve the use of underground detention facilities. Underground detention facilities may only be proposed once all other means of surface detention have been explored and exhausted and are subject to the approval of the City Engineer. All underground detention facilities shall be designed by an Oregon licensed Civil Engineer and shall be used for controlling stormwater capacity only. Stormwater quality control shall occur in accordance with Chapter 3, while hydrologic and hydraulic calculations shall be in accordance with this Chapter.~~

~~Note: To minimize the occurrence of routine maintenance, all underground detention facilities shall be designed with a water quality manhole (or equivalent) upstream, to facilitate sediment fallout prior to stormwater entering the detention facility.~~

~~4.10~~ ~~4.15.1~~ DETENTION TANKS

Detention tanks serve as runoff capacity control through the means of underground storage. Detention tanks ~~shall~~must be limited to large diameter pipes. In addition to runoff capacity control, detention tanks should be designed for factors such as environmental conditions (soil corrosiveness, inundation, etc.), maintenance access, and ground and/or surface loadings. Detention tanks ~~shall~~must comply with the following ~~criteria~~ specifications:

A. General Design:

1. The minimum pipe size allowed for a detention tank in the public stormwater system ~~shall~~is ~~be~~ 36 inches in diameter.

2. All tanks ~~shall~~must be designed as flow-through systems, incorporating the use of in line manholes for maintenance and sediment removal.

3. Detention tank bottoms ~~shall~~must be level, and ~~shall~~must be located a minimum of 0.5 feet below the inlet and outlet to provide sediment storage.

4. City owned tanks ~~shall~~must be located in the public right-of-way; tanks proposed to be located outside the public right-of-way ~~shall~~must be located in a public stormwater tract or easement, dedicated to the City of Springfield for that purpose.

B. Materials - Acceptable materials for detention are:

1. Reinforced concrete pipe, vaults, or chambers of at least 3000 psi concrete.
2. Dual wall HDPE PIPE.
3. PVC pipe.

All pipes must be installed with sufficient cover per the manufacturer's requirements for the pipe type used.

~~2. The following materials may be used if they are located outside of the public right-of-~~

~~way:~~

~~a. Corrugated or spiral rib aluminum pipe;~~

~~b. Lined corrugated polyethylene pipe; or~~

~~c. PVC pipe.~~

C. Buoyancy:

1. The effects of buoyancy ~~shall~~must be considered in areas with a known high groundwater table or areas where seasonal high groundwater may cause flotation of the detention tank. Measures such as concrete anchors, concrete backfill, subsurface drains, etc. ~~shall~~must be required in these areas, as well as supporting engineered calculations.

D. Structural Stability:

1. Special consideration ~~shall~~must be given to ensure tanks meet requirements for potential traffic loading and overburden support. Tanks ~~shall~~must be placed on stable, well- consolidated native material with appropriate bedding. A structural analysis, geotechnical analysis, and engineered calculations may be required with the design, demonstrating stability and constructability. For tanks proposed under the travel way, H20 live loadings ~~shall~~must be accommodated.

E. Access Maintenance:

1. Access easements and roads ~~shall~~must be provided when tanks are not located within the public right-of-way.

2. Access openings ~~shall~~must be provided at a distance of no less than 50 feet from any location within the tank; be a minimum of 36 inches in diameter; and meet requirements per standard manhole details 4-1 and 4-1A for lid and surrounds. ~~have watertight round lids.~~

3. All access openings ~~shall~~must have surface access for maintenance vehicles.

4. The distance from tank invert to finished grade ~~shall~~must be not more than 20 feet.

5. OSHA confined space requirements ~~shall~~must be met for tanks, and entrances to confined spaces ~~shall~~must be clearly marked.

~~F. Access Roads:~~

~~1. Access roads shall meet the requirements set forth in Section 4.07D.~~

~~**4.15.2 Detention Vaults**~~

~~Detention vaults serve as runoff capacity control through the means of underground storage. Detention vaults typically are of box-shaped design, and constructed with reinforced concrete. Besides runoff capacity control, vaults shall be designed for considerations such as environmental conditions (soil corrosiveness, inundation, etc.), maintenance access, and ground and/or surface loadings. Detention vaults shall comply with the following criteria:~~

~~A. General Design:~~

~~1. Vaults shall be designed as flow-through systems with level bottoms.~~

2. Construction material shall consist of a minimum 3,000-psi structural reinforced concrete, and all joints shall be equipped with water stops.

3. The locations of the inlet and outlet shall be elevated 0.5 feet above the vault bottom to provide for sediment storage.

B. Structural Stability:

1. Special consideration shall be given to ensure vaults meet requirements for potential traffic loading and overburden support. Vaults shall be located on well-consolidated native material, with appropriate bedding. A structural analysis, geotechnical analysis, and engineered calculations may be required with the design, demonstrating stability and constructability. Buoyancy calculations may also be required.

C. Access Maintenance:

1. Access easements and roads shall be provided in the event vaults are not located within the public right-of-way.

2. The distance from vault invert to finished grade shall be not more than 20 feet.

3. Access openings shall be provided at a distance of no less than 50 feet from any location within the vault, shall be a minimum of 36 inches in diameter, and shall have watertight round lids. Additionally, access openings shall be located at both the inlet and outlet locations of the vault.

4. All access openings shall have surface access for maintenance vehicles.

5. OSHA confined space requirements shall be met for vaults, and entrances to confined spaces shall be clearly marked.

D. Access Roads:

1. Access roads shall meet the requirements specified in Section 4.07D.

4.16 4.11 INFILTRATION FACILITIES

4.16.1 Overview

In general, infiltration facilities are used in areas of highly permeable soils, to reduce the quantity of stormwater runoff in receiving systems and to recharge the groundwater aquifer. Examples of infiltration facilities include but are not limited to retention ponds; infiltration trenches; infiltration tanks; and drywells. A geotechnical evaluation of the site, prepared by an Oregon licensed Engineer or Geotechnical Engineer, or an Oregon Registered Engineering Geologist shall be required for infiltration facilities other than single lot residential drywells and rain gardens, proposed within Springfield and its Urban Growth Boundary. Sites utilizing infiltration for stormwater management may be eligible for Systems Development Charges and Stormwater User Rate fee reductions. The Oregon Department of Environmental Quality (DEQ) regulates drywells under its Underground Injection Control (UIC) program.

4.16.2 Underground Injection Control

The DEQ regulates and registers certain infiltration facilities as underground injection wells.

Registration covers all injection wells, including stormwater disposal wells, industrial/commercial injection facilities, aquifer recharge wells, subsidence control wells, aquifer remediation wells, and other miscellaneous injection wells. In Oregon, all fresh water aquifers are protected as underground sources of drinking water (USDW). In addition to the minimum federal UIC requirements, all injection facilities shall further comply with Oregon Administrative Rule 340-44.

Drywell usage for clean roof runoff shall be considered and may be required in the overall stormwater management system design. Impervious surface area used for runoff calculations may be reduced by 25 percent of the area draining to on-site drywells.

Drywells shall be designed in accordance with Springfield Standard Drawings 4-19 and 4-20.

4.16.3 Surface Infiltration Facility Requirements

Infiltration facilities shall conform to the following standards:

A. Water Quality:

1. All infiltration facilities receiving runoff from areas other than building rooftops shall have stormwater quality treatment devices installed upstream of the facility as specified in Chapter 3. Infiltration facilities shall not be put "on-line" in the stormwater system until all upstream erosion control measures are in place, and all proposed project improvements finalized, thereby minimizing the amount of sediment laden runoff input into the facility.

2. All infiltration and water quality facilities are required to go through an Operations and Maintenance submittal process as specified in Chapter 3.

B. Soils:

1. For all proposed infiltration facilities, an Oregon licensed Civil Engineer or Geotechnical Engineer, or Oregon Registered Engineering Geologist, shall demonstrate through percolation rate testing, soil logs, and a written statement that the soil type existing on-site will function properly to allow an infiltration facility. A Geotechnical Report as referenced in SDC 5.12-120F.7 or 5.17-120I.10 shall be submitted concurrently with the proposed design. Infiltration facilities will not be allowed on soils with a high groundwater table.

C. Infiltration Rate Testing Procedures:

1. All infiltration rate testing shall comply with either: the *EPA falling head percolation test procedure* (Design Manual – Onsite Wastewater Treatment and Disposal Systems, EPA, 1980; or the *double ring infiltrometer test* (ASTM D3385).

2. Sufficient soil testing shall be performed to establish the representative permeability of the soil; however, a minimum of 3 soil tests shall be performed for each infiltration facility located on a site.

3. Each test hole shall be filled with water and maintained at depth above the test elevation for a saturation period specified for the respective test.

4. After the saturation period, the infiltration rate shall be determined based on the respective test procedures, with a head of 6 inches of water.

D. Design Infiltration Rate:

1. Research has shown that actual infiltration rates in many facilities are much lower than design infiltration rates predicted by the tests referenced above, particularly after a period of use, in that

sedimentation and ground compaction can occur. Eventually, this leads to flooding and expenditures to mitigate the problem. Therefore, the design engineer shall incorporate a safety factor of at least 2 into the design infiltration rate. The maximum design infiltration rate used for sizing facilities shall be 10 inches per hour.

E. Overflow – Emergency Spillway:

1. Infiltration facility overflow systems shall provide controlled discharge of the design storm event for developed contributing area without overtopping any part of the infiltration facility or exceeding the capacity of the emergency spillway. The design shall provide controlled discharge directly into the downstream conveyance system. An emergency overflow spillway shall be provided to safely pass the 100-year, 24-hour design storm event in the event of failure. The spillway shall be located to direct overflows safely towards the downstream conveyance system.

4.17 LOW IMPACT DEVELOPMENT APPROACHES

Low Impact Development Approaches (LIDA) is the required method to manage stormwater runoff in urban areas. LIDA work with the natural and urban surroundings to manage stormwater as close to its source as possible. The LIDA method strives to treat runoff as a resource that is utilized to enhance a development rather than a waste product. This approach includes several technologies such as:

- Rain Gardens
- Infiltration Swales
- Retention Ponds
- Infiltration Planters
- Green Roofs
- Rainwater Harvesting & Reuse
- Permeable Pavements

If effectively implemented, LIDA may have lower construction costs than conventional stormwater treatment infrastructure and can reduce the needed space for these facilities. In some cases, LIDA can supplement and even replace irrigation systems for landscaped areas and reduce the need for a traditional, extensive underground piping network to drain a dense, urban area.

Many of the undeveloped areas within the Springfield Urban Growth Boundary do not have access to a public stormwater management system. Installing public infrastructure may be costly to developers and utilization of LIDA can substantially reduce these costs. Upgrading existing stormwater systems within the developed area of Springfield will also be costly and reducing runoff from increasing densities from redevelopment will allow Springfield to manage and treat runoff with fewer costly upgrades to existing stormwater systems. LIDA systems are also easily integrated with required landscape areas and as such can be incorporated during development or redevelopment at little additional cost to the property owner and developer.

4.17.1 Requirements For Low Impact Development Approach Areas

Springfield currently requires development and redevelopment within the Glenwood Refinement Plan boundary to use LIDA for stormwater management. LIDA is encouraged elsewhere in Springfield and the developer may utilize this approach in any area if site conditions are suitable. In addition, LIDA systems may be applicable in other areas without access to a stormwater system that has sufficient capacity for the increased runoff due to development.

The following criteria shall be used when designing stormwater systems utilizing LIDA:

~~1. Within the Glenwood Refinement Plan Boundary, all development sites must capture and retain on-site the first 1 inch of rainfall in a 24-hour period using on-site LIDA systems.~~

~~2. The site soils shall be evaluated for infiltration capability as stated in 4.16.3 when designing LIDA systems.~~

~~3. The amount of runoff infiltrated shall be maximized to the greatest extent practicable taking into account site limitations such as soil type and site location.~~

~~4. Offsite runoff shall be minimized to the greatest extent practicable. The City Engineer may waive or reduce this requirement in cases where a suitable offsite disposable area is available.~~

~~5. The riparian setback and other landscaped areas of any development site shall be utilized for stormwater treatment and infiltration where practicable.~~

~~6. For development sites adjacent to public open space areas with sufficient capacity to infiltrate additional runoff, an overflow connection from the site to the public open space will be allowed. For maximum effectiveness of the overall stormwater facilities, design of onsite and adjacent open space treatment areas shall be coordinated where practicable.~~

~~7. LIDA systems shall be designed in conformance with Eugene's *Stormwater Management Manual*. For a system that a developer may want to use that is not included in Eugene's manual, the developer must provide the City Engineer with the applicable design standards and criteria from a public agency that has approved its use. The City Engineer will review the developer's proposal and determine if that system is acceptable for use in Springfield at the desired location.~~

COMMENTARY: This section was added for a clear standard to be used to ensure the long term function of permeable pavements.

~~4.17.2~~ 4.11.1 Requirements for Permeable Pavements for Impermeable Area Reduction

Permeable Pavements may be used for impermeable area reduction only and not utilized for stormwater quality treatment or stormwater destination from other impermeable surface.

All permeable pavements used for driveways, residential, or commercial parking areas must be constructed of material that is firmly bonded so that it cannot be displaced or moved during its intended use and is durable and dust free. Loose fill permeable pavements are allowed on maintenance and emergency access areas or other areas that are not to be used for daily vehicular traffic.

Permeable pavements are not allowed in areas with a high likelihood of pollutant spills such as (but not limited to) vehicle service areas, loading docks, and trash enclosures or handling areas. Permeable pavements should not be used in high traffic areas such as drive through lanes, loading/unloading areas, or main access aisles of parking lot.

If permeable pavement is to be used in a proposed development, the use must be approved during site plan review (if applicable), Drinking Water Protection permit (if applicable), and building permit review. To be approved the following items are required to be submitted for review:

A. Site Requirements:

1. The location of the permeable pavement on the site showing the permeable pavement location is no steeper than 5 percent slope in any direction and setback from any foundation by at least 10 feet and any private property line by at least 5 feet. Permeable pavement may be placed directly adjacent to public right-of-way but may not be placed in utility easements.

2. An on-site infiltration test by a qualified professional using the method in the City of Springfield Development Code Appendix C showing the soil is suitable for permeable pavement installation so that the base aggregate can contain the 10 year storm OR an underdrain system is provided to a public system with sufficient capacity for the discharge from the underdrain system.

B. Permeable pavement section requirements

1. A full cross-section of the pavement structure from the subgrade to the top of pavement must be provided by either the manufacturer of the pavement product or a licensed professional engineer.

2. Existing ground/subgrade. The subgrade should be uncompacted and native material if possible. If placed in compacted soil or compacted fill, an underdrain system is required.

3. Geotextile fabric is required between the base rock and the subgrade. If the section is designed to infiltrated into the subgrade the fabric must be permeable. Additional permeable fabric may be required between layers within the pavement section as shown by the manufacturer or engineer.

4. Aggregate base rock: A permeable layer of open graded base rock must be provided for storage of runoff and the structural platform for the wearing surface. The aggregate base layer must be designed to accommodate the specific volume of rainfall storage required and the anticipated surface design loads. In no case may the layer be less than 6 inches. This must be clearly labeled with for thickness and material, Diameter of aggregate base must be no greater than 2-1/2 inch and no less than 3/4-inch and consist of crushed rock.

5. Bedding course: Some permeable pavement products and designs require a shallow layer between the aggregate base rock and the paving course, typically sand or small diameter crushed rock. If used, this layer must be clearly labeled for thickness and material and no less than 1 inch thick

6. Paving/top course: Paving courses must be designed for the anticipated surface loads and the aggregate base layer design. All paving courses must be permeable as to infiltrate stormwater directly into the aggregate base layer. Asphalt mixes must be of the open graded design. Permeable concrete mixes must be of the open graded design with little or no sand. Permeable pavers and other premanufactured products should be installed per manufacturer's recommendations.

7. Underdrains: If the permeable paving is to be installed in area without adequate infiltration an underdrain must be provided. This must consist of perforated PVC or HDPE pipe no less than 3 inches in diameter, provided with a wrapped, permeable geotextile material and drain to a stormwater management system, public or private, that meets the requirements in Chapter 4 of the City of Springfield EDSPM.

8. If propriety permeable pavement material is being proposed, a complete set of manufacturer's specifications for the permeable pavement section, installation, suitability for the intended use, and all materials is required.

C. Permeable Pavement Inspection Requirements
Inspection and proper documentation are required for permeable pavement at the following points in construction:

1. When excavation of the section is complete and the underdrain has been installed (if an underdrain is required) to verify the full depth of the section is excavated and the native material is uncompacted.

2. When the aggregate base rock is installed but before the bedding course or pavement/top course is installed. As part of this inspection a load ticket or other approved proof is required that the aggregate base rock meets the material as specified in the approved pavement section submitted with the development approval or the building permit.

3. When the top course is finished and the pavement is fully installed. As part of this inspection a load ticket or other approved proof is required that the pavement/top course meets the material as specified in the approved pavement section submitted with the development approval or the building permit.

COMMENTARY This section was moved from the now vacant Chapter 3 as an advisory section for proper maintenance procedures.

~~3.02.7~~ 4.12 PARKING LOT MAINTENANCE

~~In addition to the above requirements,~~ Springfield highly recommends routine surface cleaning of parking lots. The use of "dry" cleaning techniques (sweeping, vacuuming, etc.) is highly preferred because they eliminate water discharges to the storm system. Absorbent material ~~shall~~must be used on particularly oily or dirty surfaces prior to cleaning. Generally, parking lots should be cleaned prior to the wet season ~~(i.e. October)~~ to dampen the effects of the first flush. Additional cleanings can be determined through on-site observations and accumulations of sediments. Parking lot debris from cleanup ~~shall~~must be disposed of at a landfill.

Wet cleaning techniques (pressure washing, garden hoses, etc.) involving water for parking lot cleanup are regulated by the Springfield Municipal Code (SMC), Sections 4.370 and 4.372. If parking lots must be washed with water, contact the Environmental Services Division for information regarding requirements and disposal of cleaning water. Wash water ~~shall~~must not be directed into the stormwater system under any circumstances without required BMPs being implemented.

Routine area drains and catch basin cleaning ~~shall~~must also be done as part of parking lot cleaning activities. Storm catch basins collect debris such as oils, ~~paper,~~ sediments, and ~~other~~ trash. If not routinely cleaned this debris will plug the discharge pipe and cause flooding as well as discharging polluted water into the public stormwater system. Discharge of polluted stormwater is a violation of the SMC Section 4.372~~(6)~~ and is subject to a fine.

Legislative Version of Proposed Amendments to the Engineering Design Standards and Procedures Manual Table of Contents to Incorporate MS4 Permit Requirements

PROPOSED AMENDMENTS
Various Sections of the Engineering Manual (EDSPM) are amended to remove barriers to Low-Impact Development and define stormwater terms. Commentary is shown in *purple italics font*, preceding the text to which it is referring.

EDSPM APPENDIX TABLE OF CONTENTS

Section I Design Standard

Chapter 1.00	**Streets and Sidewalks**
~~**Appendix 1A**~~	~~Appendix 1A: Glenwood Riverfront Street Cross-Section Standards **Effective May 21, 2018 Appendix 1A has been moved to the Development Code **~~
Chapter 2.00	**Sanitary Sewers and Pump Stations**
Commentary:	*Chapter 3 of the Engineering Manual (EDSPM) is no longer in the EDSPM. Sections are part of the Springfield Development Code (SDC) or moved to other portions of the EDSPM.*
Chapter 3.00	~~**Stormwater Quality**~~**Reserved for Future Use**
~~**Appendix 3A**~~	~~Appendix 3A: Information Packet for Stormwater Quality Facility Operations and Maintenance Plan~~
~~**Appendix 3A-1**~~	~~Appendix 3A-1: Notice of Operations and Maintenance Agreement~~
~~**Appendix 3A-2**~~	~~Appendix 3A-2: Operations and Maintenance Agreement~~
~~**Appendix 3A-3**~~	~~Appendix 3A-3: Stormwater Management Facility Inspection and Maintenance Log~~
~~**Appendix 3A-4**~~	~~Appendix 3A-4: Facility Specific Operations and Maintenance Plans~~
Commentary:	*Chapter 4 of the Engineering Manual (EDSPM) has been revised. Some sections are part of the Springfield Development Code (SDC) or were moved to other portions of the EDSPM.*
Chapter 4.00	**Stormwater ~~Capacity~~**
Appendix 4A	Stormwater Subsurface Filtration/Infiltration Spreedsheet
Appendix 4B	Stormwater Surface Filtration/Infiltration Spreedsheet
Appendix 4C	Simplified Approach to Stormwater Management (SIM Form)
Chapter 5.00	**Traffic Standards**
Appendix 5A	Appendix 5A: Intersection Control Checklist

Commentary:	*Appendices 6A and 6B of the Engineering Manual (EDSPM) is no longer in the EDSPM. Sections are part of the Springfield Development Code (SDC).*
Chapter 6.00	**Landscape Vegetation**
~~**Appendix 6A**~~	~~Appendix 6A: Approved Street Tree List~~
~~**Appendix 6B**~~	~~Appendix 6B: Approved Vegetation List~~
Drawing 2.1	**Drawing 2.1: Street Tree Location**
Drawing 2.2	**Drawing 2.2: Street Tree Installation**
Chapter 7.00	**Hillside Development**
Chapter 8.00	**Erosion and Sediment Control Plan Design**
Appendix 8A	Appendix 8A: Oregon Department of Environmental Quality General
Permit 1200-C	
Appendix 8B	Appendix 8B: Oregon Department of Environmental Quality General
Permit 1200-CN	
Section II	**Drafting Standards**
Chapter 9.00	**Drafting Standards**
Chapter 10.00	**Electronic Acceptance Standards**
Section III	**Procedures**
Chapter 11.00	**Pre-Design**
Chapter 12.00	**Public Improvement Permit Projects**

NEW: Some of the requirements and forms referenced in Chapter 12.00 have changed as of July 1, 2021. New forms containing all current requirements are available at the following link: Engineering & Construction Resources.

Chapter 13.00	**Reserved For Future Use**

Stormwater SubSurface Filtration/Infiltration Facility Sizing Spreadsheet
24 Hour Storm, NRCS Type 1A Rainfall Distribution
City of Springfield

Version 2.1

Project Information

Project Name:	[Sample Project]	**Date:**	[Date]
Project Address:	[#### Street or Intersection]	**Permit Number:**	[Permit #]
	Springfield, OR [Zip Code]	**Catchment ID:**	[Catchment ID]
Designer:	[Designer Name]		
Company:	[Company Name]		

Instructions:

1. Complete this form for each drainage catchment in the project site that is to be sized per the Presumptive Approach.
2. Provide a distinctive Catchment ID for each facility coordinated with the site basin map to correlate the appropriate calculations with the facility.
3. The maximum drainage catchment to be modeled per the Presumptive Approach is 1 acre (43,560 SF)
4. For infiltration facilities in Class A or B soils where no infiltration testing has been perfromed use an infiltration rate of 0.5 in/hr. Maximum design

Design Requirements:

Choose "Yes" from the dropdown boxes below next to the design standards requirements for this facility.

Pollution Reduction (PR)	Yes	*Soakage trenches draining commerical parking lots require pre-treatment to meet pollution reduction requirements
Flow Control (FC)	Yes	
Destination (DT)	Yes	*An infiltration facility must be chosen as the facility type to meet destination requirements

Site Data-Post Development

Total Square Footage Impervious Area=		sqft	**Total Square Footage Pervious Area=**		sqft
Impervious Area CN=			**Pervious Area CN=**		
Total Square Footage of Drainage Area=		sft	**Time of Concentration Post Development=**		min
Weighted Average CN=					

Site Data-Pre Development **(Data in this section is only used if Flow Control is required)**

Pre-Development CN=			**Time of Concentration Pre-Development=**		min

Soil Data

Tested Soil Infiltration Rate=		in/hr (See Note 4)	**Destination Design=**	N/A	in/hr
Design Soil Infiltration Rate=	0	in/hr	**Soil Infiltration Rate**		

Design Storms Used For Calculations

Requirement	Rainfall Depth		Design Storm
Pollution Reduction	1.4	inches	Water Quality
Flow Control	3.6	inches	Flood Control
Destination	3.6	inches	Flood Control

Facility Data

Facility Type=			**Facility Surface Area=**	0	sqft
Surface Width=		ft	**Facility Surface Perimeter=**	0	ft
Surface Length=		ft	**Basin Volume=**		cf

Layer Properties

	Material	Facility Depth (in)	Percent Voids	Effective Storage Depth (in)
Layer 1				0.0
Layer 2				0.0
Layer 3				0.0
Layer 4				0.0
	Totals=	0.0 in		**0.0** in

Pollution Reduction-Calculation Results

Peak Flow Rate to Stormwater Facility =		cfs	Peak Facility Overflow Rate=	0.000 cfs
Total Runoff Volume to Stormwater Facility =		cf	Total Overflow Volume=	0 cf
Max. Eff. Depth of Stormwater in Facility=		in		
Drawdown Time=		hours		

Yes **Facility Sizing Meets Pollution Reduction Standards?**

YES Meets Requirement of No Facility Flooding?
YES Meets Requirement for Maximum of 18 Hour Drawdown Time?

Flow Control-Calculation Results

Peak Flow Rate to Stormwater Facility =		cfs	Peak Facility Overflow Rate=	cfs
Total Runoff Volume to Stormwater Facility =		cf	Total Overflow Volume=	cf
Max. Eff. Depth of Stormwater in Facility=		in	Peak Off-Site Flow Rate Filtration Facility Underdrain=	cfs
Drawdown Time=		hours		

Pre-Development Runoff Data

Peak Flow Rate =		cfs
Total Runoff Volume =		cf

Yes **Facility Sizing Meets Flow Control Standards?**

YES Meets Requirement for Post Development offsite flow less or equal to Pre-Development Flow?
YES Meets Requirement for Maximum of 18 Hour Drawdown Time?

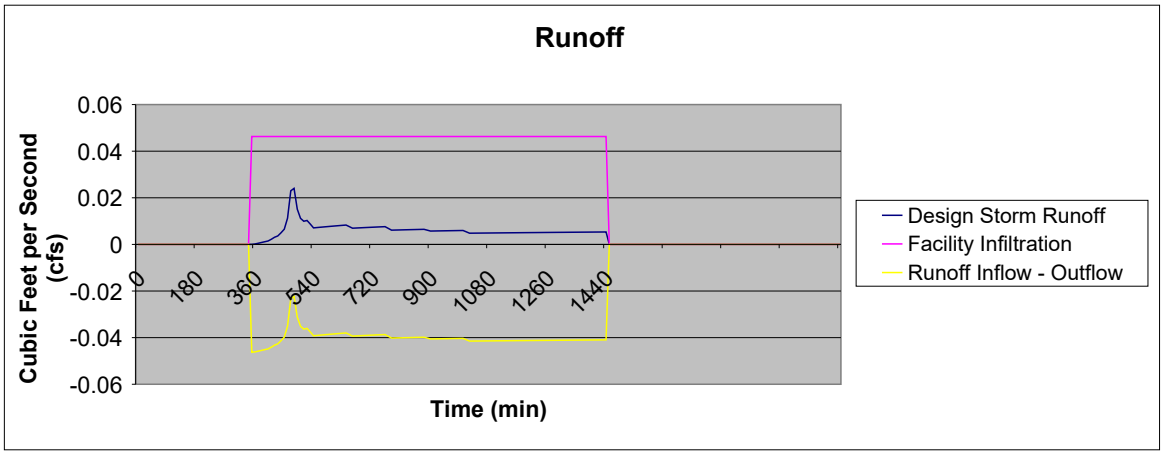
Destination-Calculation Results

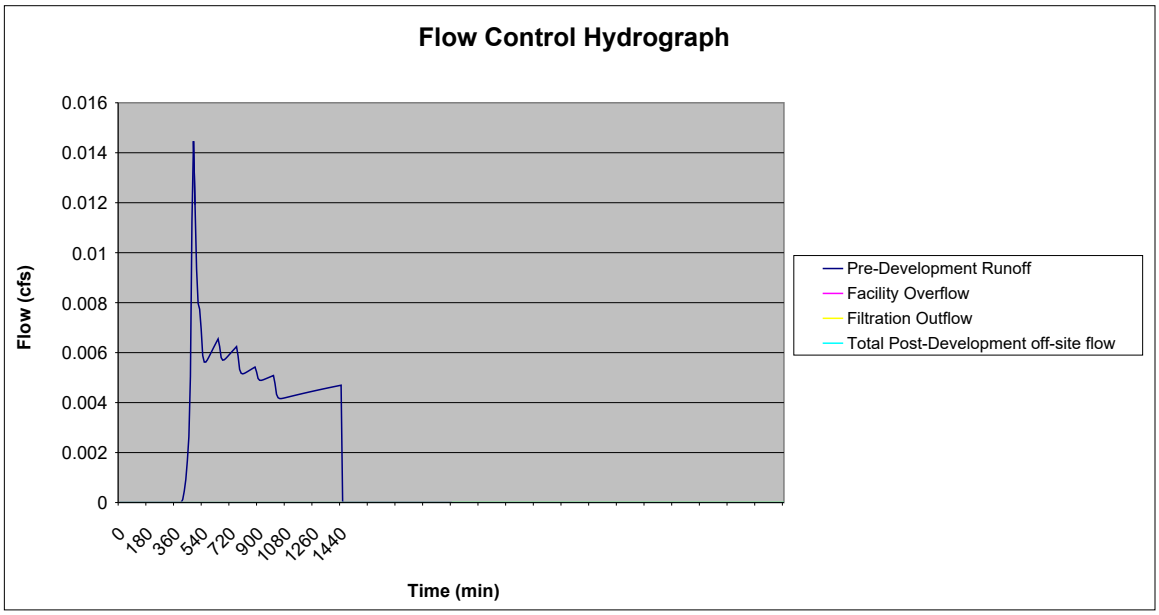
Peak Flow Rate to Stormwater Facility =		cfs	Peak Facility Overflow Rate=	cfs
Total Runoff Volume to Stormwater Facility =		cf	Total Overflow Volume=	cf
Max. Eff. Depth of Stormwater in Facility=		in		
Drawdown Time=		hours		

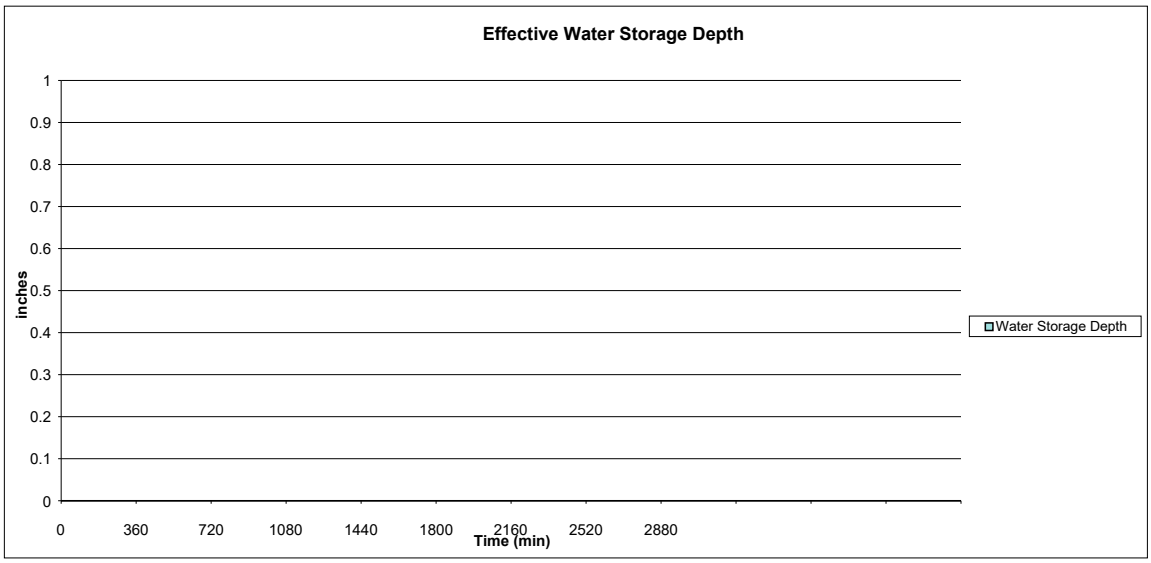
N/A **Facility Sizing Meets Destination Standards?**

N/A Meets Requirement of No Facility Flooding?
N/A Meets Requirement for Maximum of 30 hour Drawdown Time?

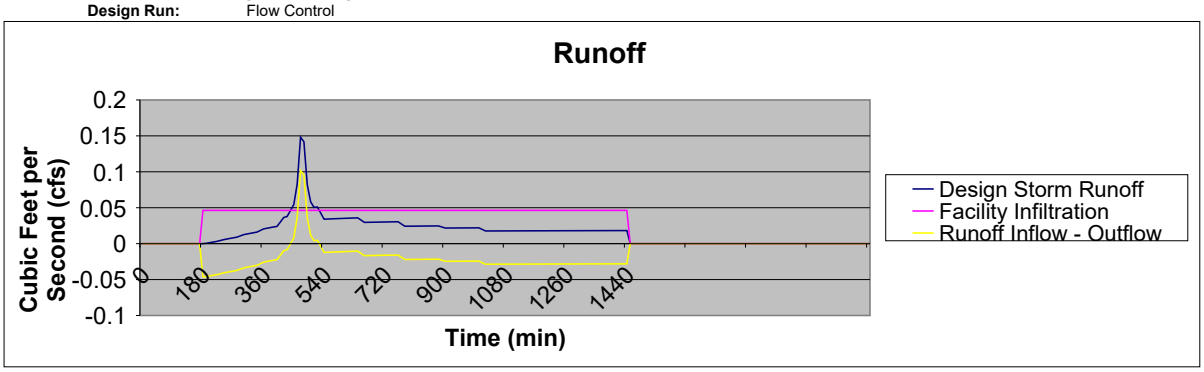
Project Name: [Sample Project]
Permit Number: [Permit #]
Catchment ID: [Catchment ID]
Design Run: Pollution Reduction

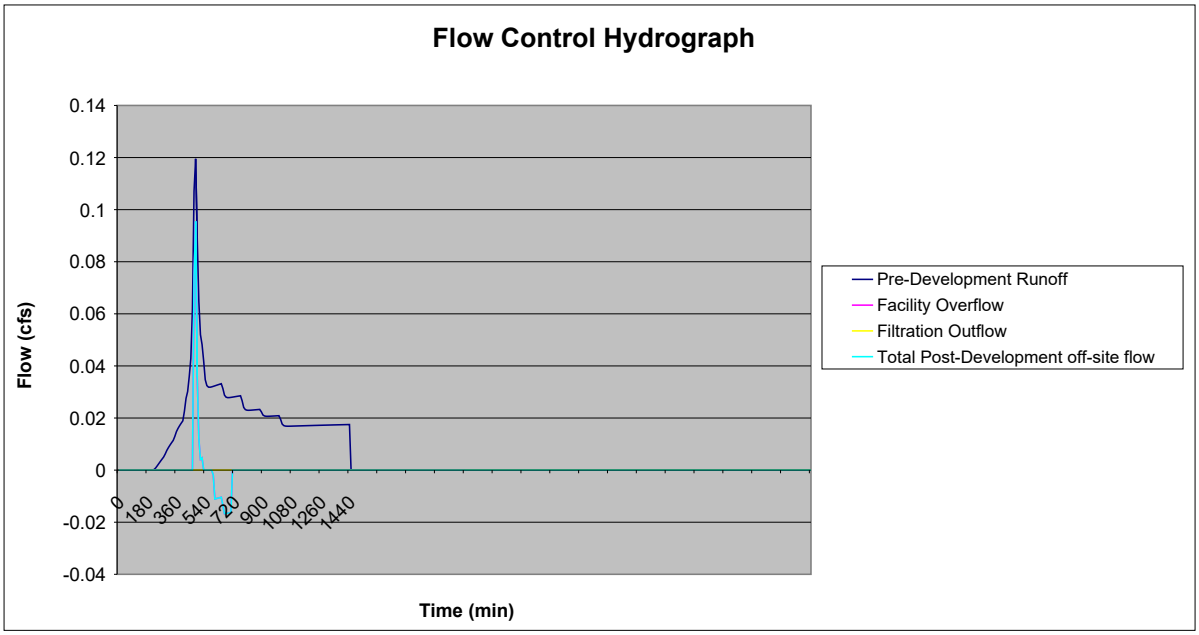


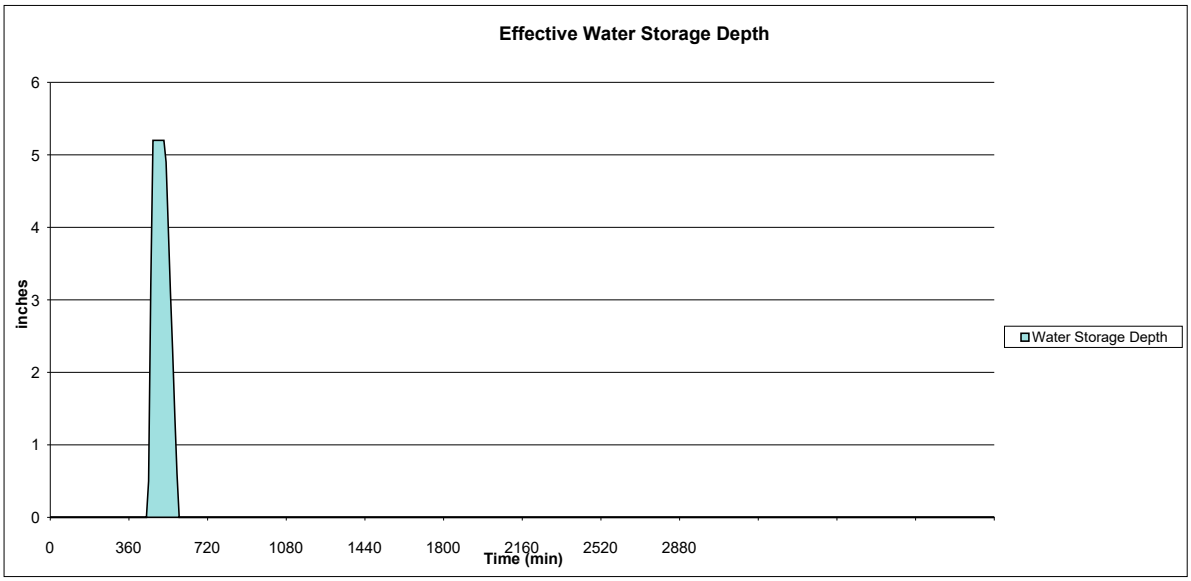




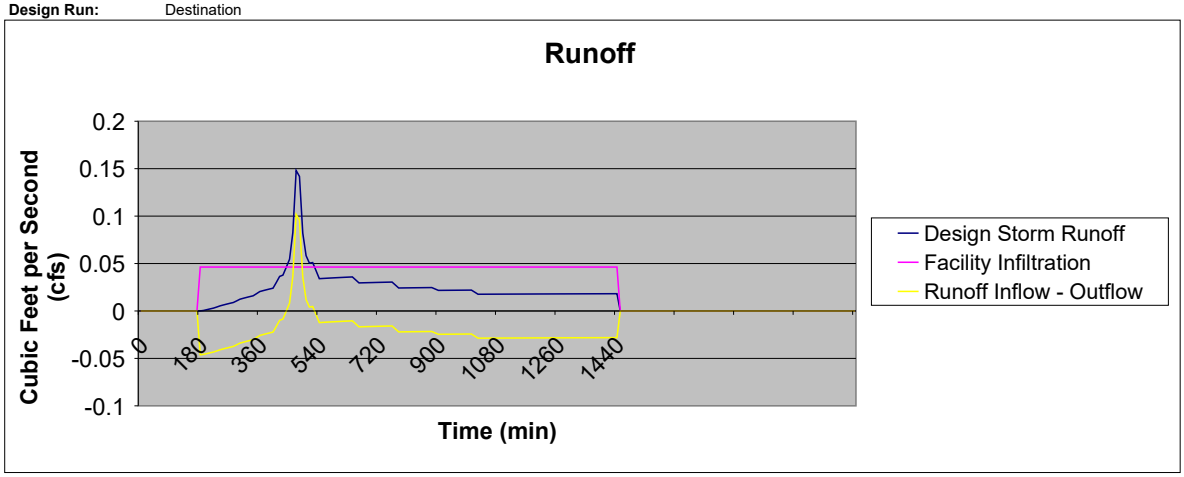
Project Name: [Sample Project]
Permit Number: [Permit #]
Catchment ID: [Catchment ID]
Design Run: Flow Control

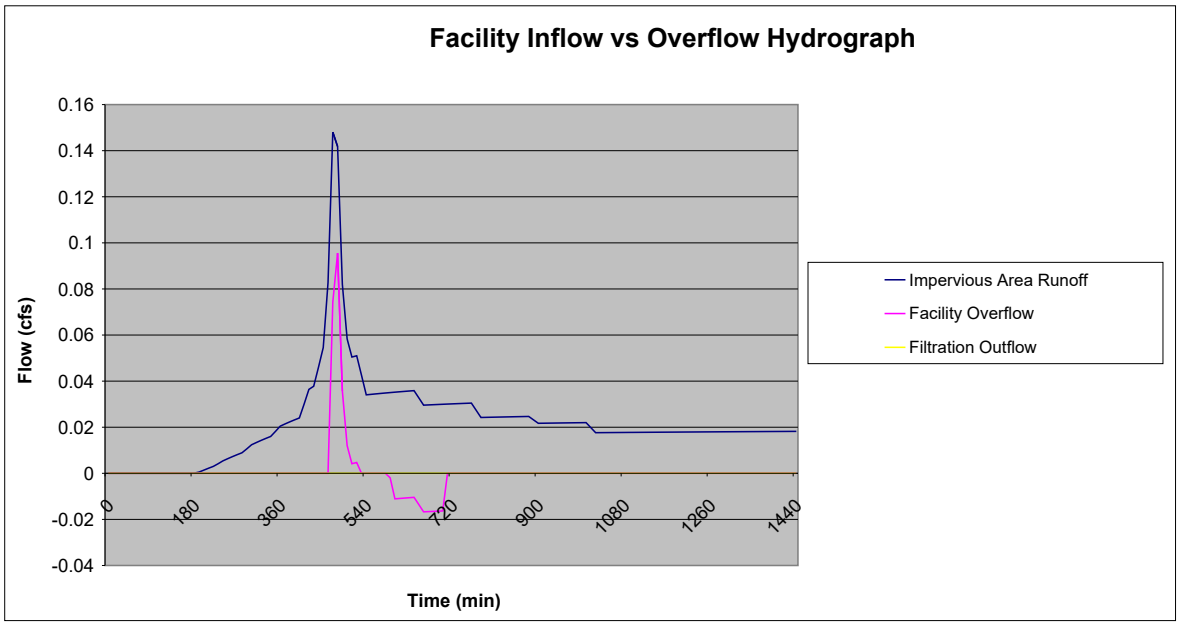


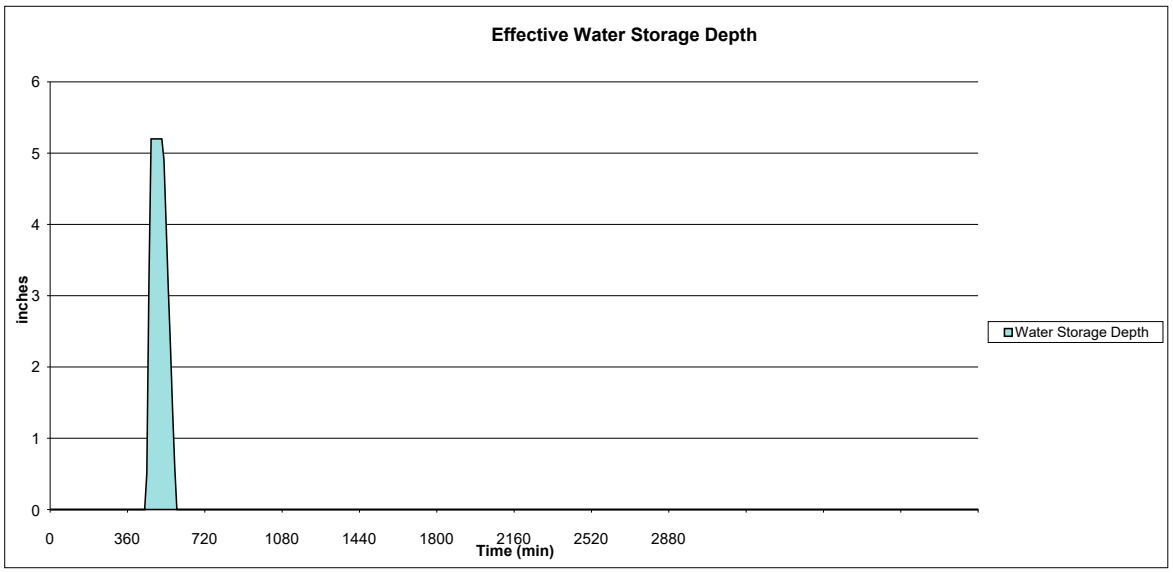




Project Name: [Sample Project]
Permit Number: [Permit #]
Catchment ID: [Catchment ID]
Design Run: Destination







Stormwater Surface Filtration/Infiltration Facility Sizing Spreadsheet
24 Hour Storm, NRCS Type 1A Rainfall Distribution
City of Springfield

Version 2.1

Project Information

Project Name:	[Sample Project]	**Date:**	[Date]
Project Address:	[#### Street or Intersection]	**Permit Number:**	[Permit #]
	Springfield, OR [Zip Code]	**Catchment ID:**	[Catchment ID]
Designer:	[Designer Name]		
Company:	[Company Name]		

Instructions:

1. Complete this form for each drainage catchment in the project site that is to be sized per the Presumptive Approach.
2. Provide a distinctive Catchment ID for each facility coordinated with the site basin map to correlate the appropriate calculations with the facility.
3. The maximum drainage catchment to be modeled per the Presumptive Approach is 1 acre (43,560 SF)
4. For infiltration facilities in Class A or B soils where no infiltration testing has been perfromed use an infiltration rate of 0.5 in/hr. For all facilities use a maximum soil infiltration rate of 2.5 in/hr for topsoil/growing medium.

Design Requirements:

Choose "Yes" from the dropdown boxes below next to the design standards requirements for this facility.

Pollution Reduction (PR)	Yes
Flow Control (FC)	No
Destination (DT)	No

*An infiltration facility must be chosen as the facility type to meet destination requirements

Site Data-Post Development

Total Square Footage Impervious Area=	6000	sqft	**Total Square Footage Pervious Area=**	6000	sqft
Impervious Area CN=	98		**Pervious Area CN=**	85	
Total Square Footage of Drainage Area=	12000	sft	**Time of Concentration Post Development=**	5	min
Weighted Average CN=	92				

Site Data-Pre Development (Data in this section is only used if Flow Control is required)

Pre-Development CN=	85		**Time of Concentration Pre-Development=**	10	min

Soil Data

Tested Soil Infiltration Rate=	2.5	in/hr (See Note 4)	**Destination Design=**	N/A	in/hr
Design Soil Infiltration Rate=	2.5	in/hr	**Soil Infiltration Rate**		

Design Storms Used For Calculations

Requirement	Rainfall Depth		Design Storm
Pollution Reduction	1.4	inches	Water Quality
Flow Control	3.6	inches	Flood Control
Destination	3.6	inches	Flood Control

Facility Data

Facility Type=	Infiltration Stormwater Planter		**Facility Surface Area=**	175	sqft
Surface Width=	5	ft	**Facility Surface Perimeter=**	80	ft
Surface Length=	35	ft	**Facility Bottom Area=**	175	sqft
Facility Side Slopes=	0	to 1	**Facility Bottom Perimeter=**	80	ft
Max. Ponding Depth in Stormwater Facility=	6	in	**Basin Volume=**	87.5	cf
Depth of Growing Medium (Soil)=	18	in	**Ratio of Facility Area to Impervious Area=**	0.015	

Pollution Reduction-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.047	cfs	Peak Facility Overflow Rate=	0.003	cfs
Total Runoff Volume to Stormwater Facility =	686	cf	Total Overflow Volume=	29	cf
Max. Depth of Stormwater in Facility=	6.0	in			
Drawdown Time=	0.2	hours			

NO **Facility Sizing Meets Pollution Reduction Standards?**

NO **Meets Requirement of No Facility Flooding?**
YES **Meets Requirement for Maximum of 18 Hour Drawdown Time?**

Flow Control-Calculation Results

Peak Flow Rate to Stormwater Facility =	0.212	cfs	Peak Facility Overflow Rate=	0.201	cfs
Total Runoff Volume to Stormwater Facility =	2677	cf	Total Overflow Volume=	1818	cf
Max. Depth of Stormwater in Facility=	6.0	in	Peak Off-Site Flow Rate Filtration Facility Underdrain=	N\A	cfs
Drawdown Time=	2.5	hours			

Pre-Development Runoff Data

Peak Flow Rate =	0.143	cfs
Total Runoff Volume =	2104	cf

N\A **Facility Sizing Meets Flow Control Standards?**

N\A **Meets Requirement for Post Development offsite flow less or equal to Pre-Development Flow?**
N\A **Meets Requirement for Maximum of 18 Hour Drawdown Time?**

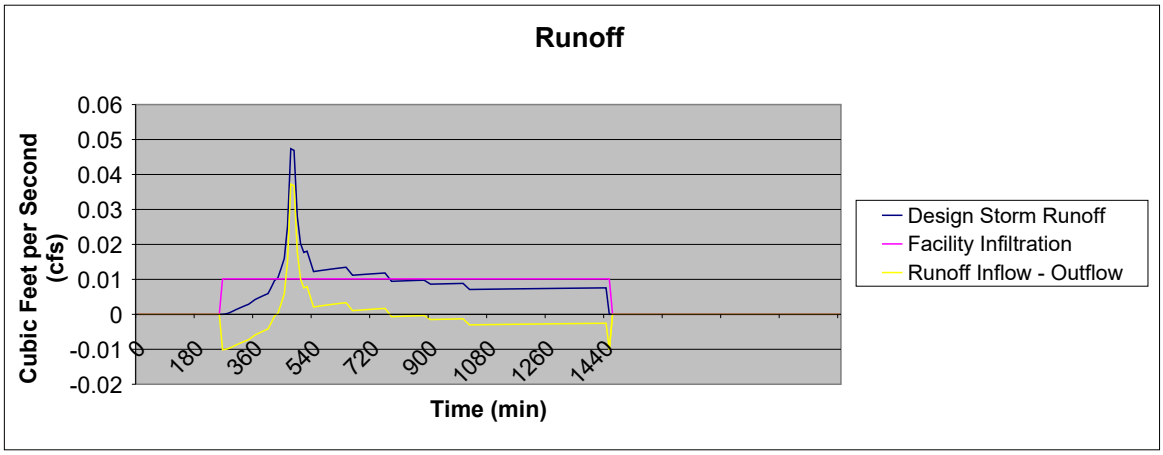
Destination-Calculation Results

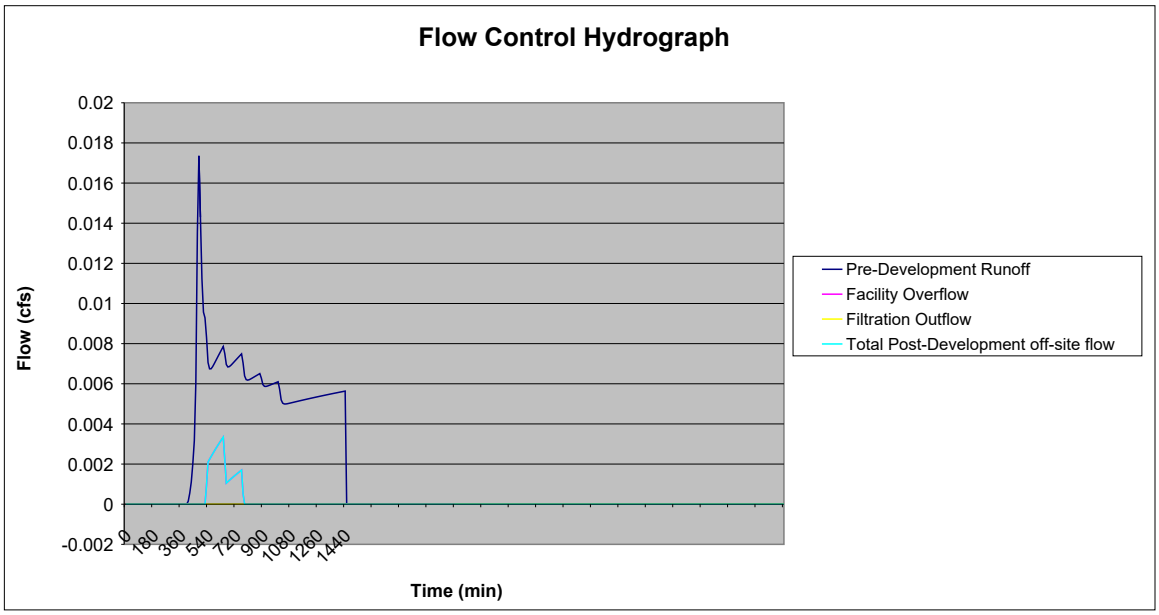
Peak Flow Rate to Stormwater Facility =	N/A	cfs	Peak Facility Overflow Rate=	N/A	cfs
Total Runoff Volume to Stormwater Facility =	N/A	cf	Total Overflow Volume=	N/A	cf
Max. Depth of Stormwater in Facility=	N/A	in			
Drawdown Time=	N/A	hours			

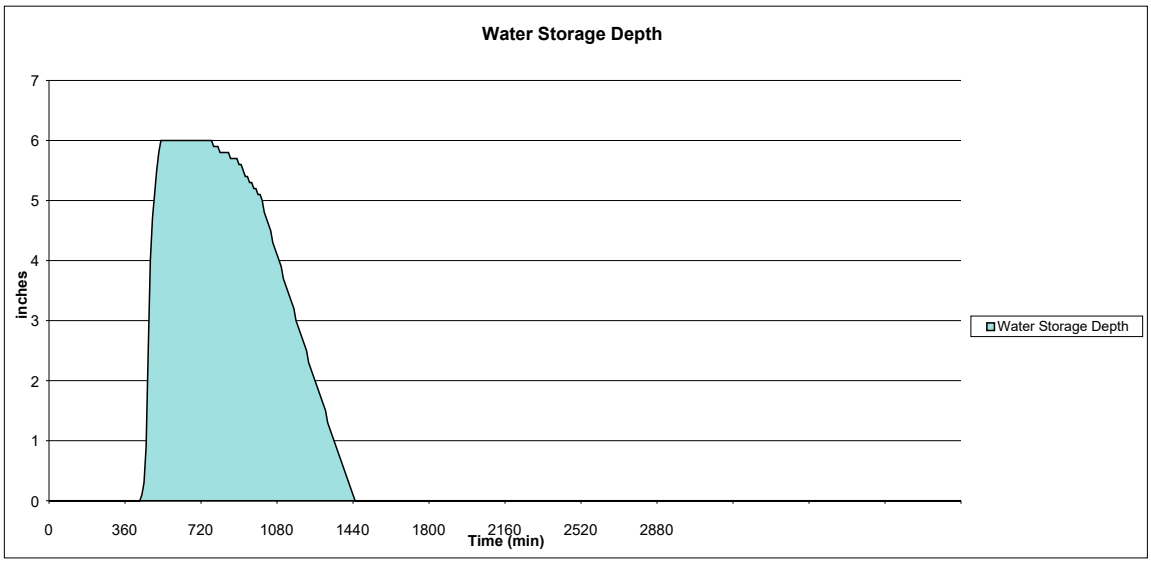
N/A **Facility Sizing Meets Destination Standards?**

N/A **Meets Requirement of No Facility Flooding?**
N/A **Meets Requirement for Maximum of 30 hour Drawdown Time?**

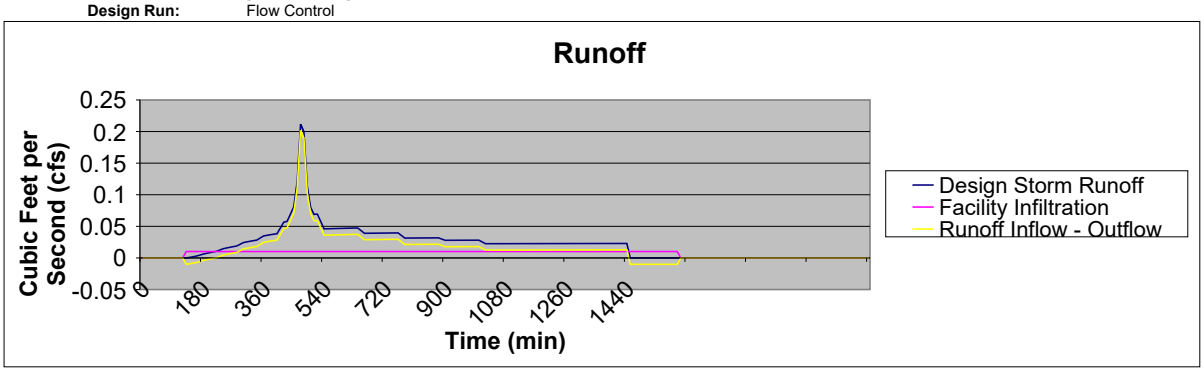
Project Name: [Sample Project]
Permit Number: [Permit #]
Catchment ID: [Catchment ID]
Design Run: Pollution Reduction

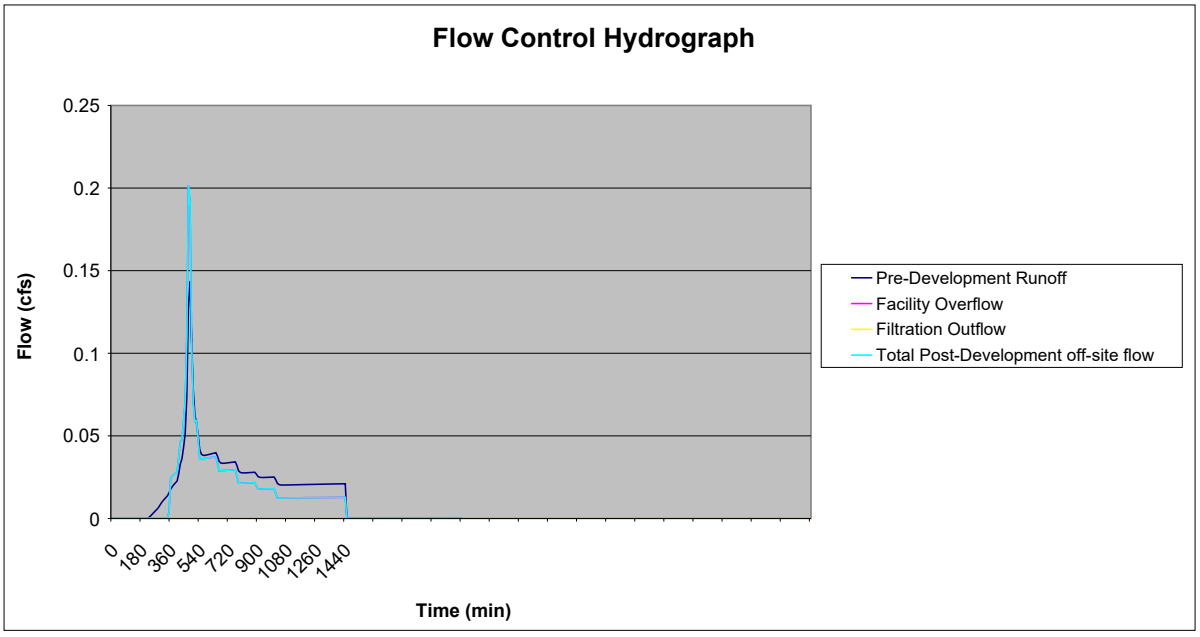


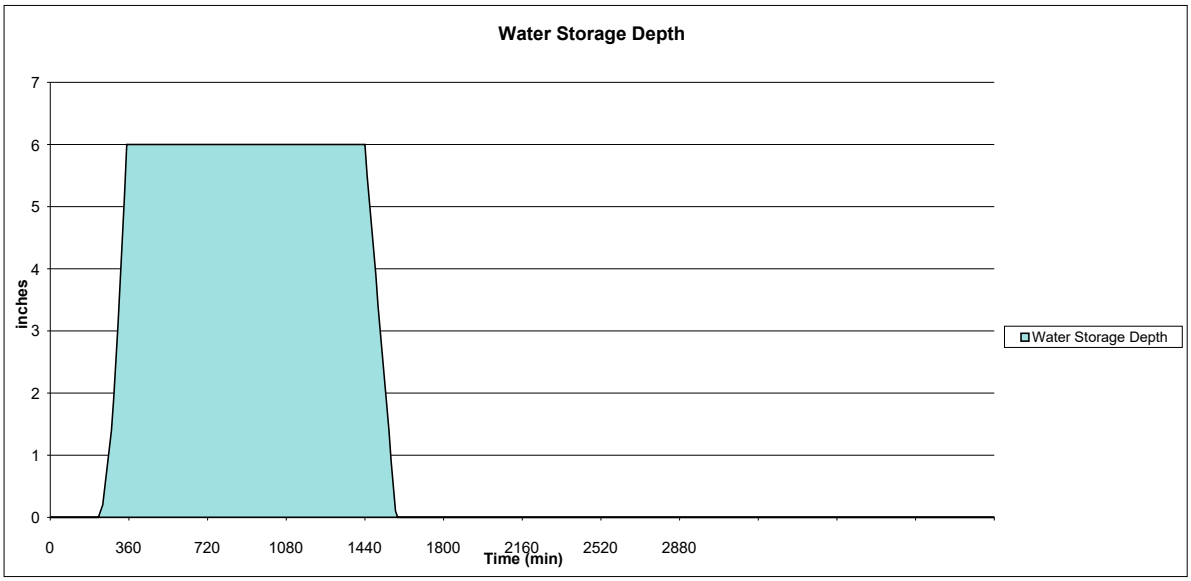




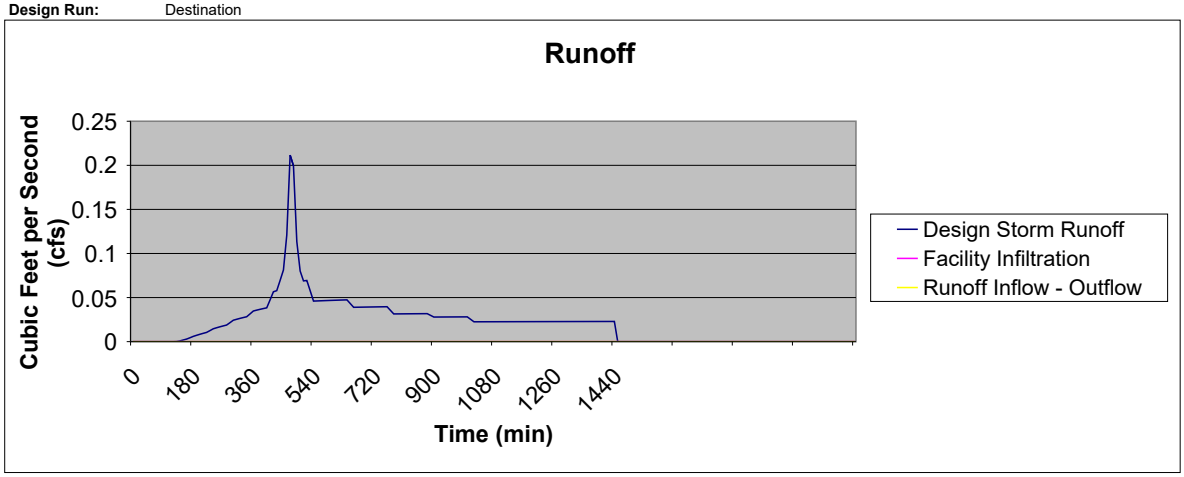
Project Name: [Sample Project]
Permit Number: [Permit #]
Catchment ID: [Catchment ID]
Design Run: Flow Control

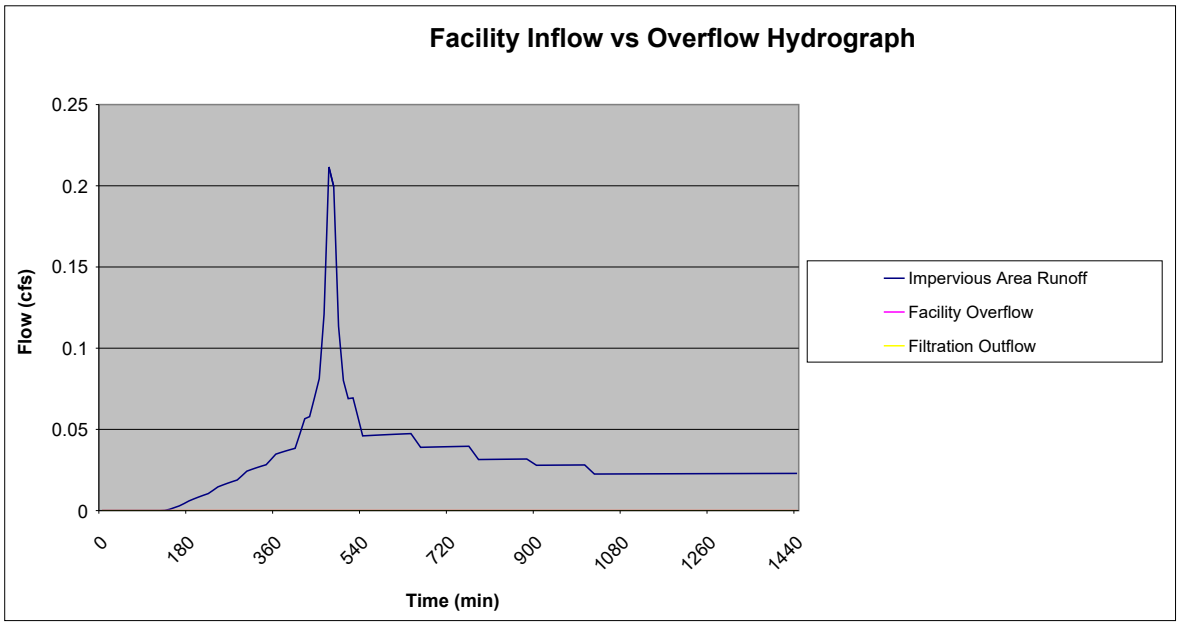


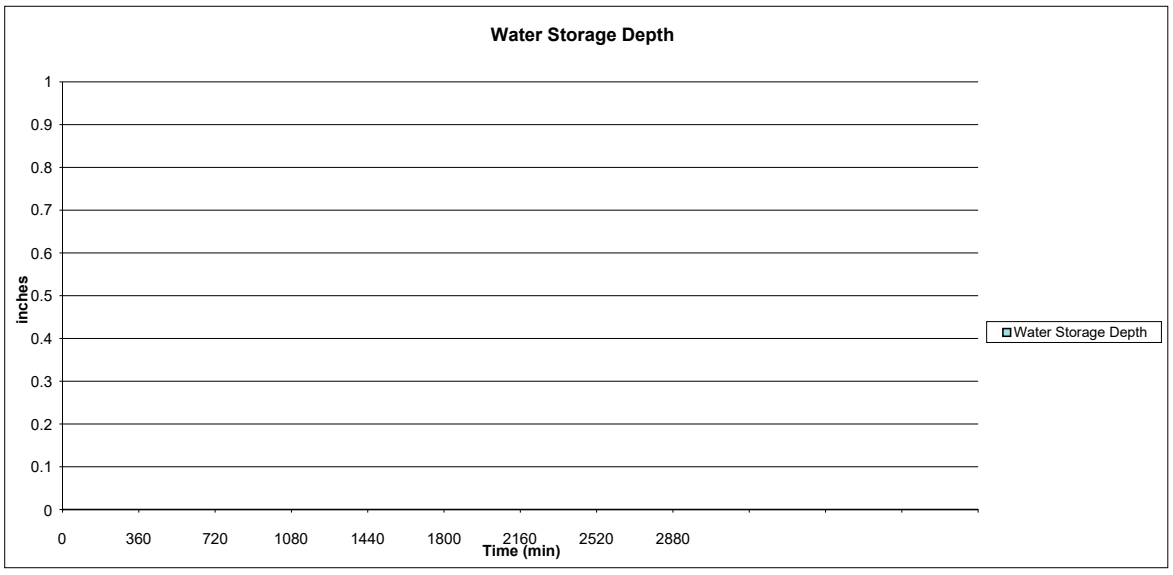




Project Name: [Sample Project]
Permit Number: [Permit #]
Catchment ID: [Catchment ID]
Design Run: Destination







SIM FORM: 2014 (Simplified Approach for Stormwater Management)

Application _____ Building Permit # _____

Address _____

_____ Residential/Commercial

Tax Lot # _____ (Circle One)

NRCS Soil Type or

Measured Infiltration Rate _____

Facility Sizing

Total Proposed New or Replaced Impervious Surface Area → [ ] Box 1

Impervious Area Reduction

Permeable Pavements _____ sf

Eco-Roof _____ sf

Contained Planter _____ sf

Tree Credit _____ sf

Total Impervious Area Reduction → [ ] Box 2

Total Impervious Area Requiring Stormwater Management → [ ] Box 3

(Box 1 - Box 2)

Facility Sizing for Water Quality Only

Surface Facilities	Impervious Area Managed		Sizing Factor		Facility Surface Area
Rain Garden	_____ sf	x	0.05	=	_____
Stormwater Planter	_____ sf	x	0.03	=	_____
Swale	_____ sf	x	0.06	=	_____
Vegetated Filter Strip	_____ sf	x	0.2	=	_____
Sand Filter	_____ sf	x	0.03	=	_____

Facility Sizing for Water Quality and Flow Control

Surface Facilities	Impervious Area Managed		Sizing Factor		Facility Surface Area
Rain Garden	_____ sf	x	0.11	=	_____
Stormwater Planter	_____ sf	x	0.07	=	_____
Sand Filter	_____ sf	x	0.07	=	_____

Facility Sizing for Water Quality, Flow Control and Flood Control * Only for use in Type A & B Soils**

Surface Facilities	Impervious Area Managed		Sizing Factor		Facility Surface Area
Rain Garden	_____ sf	x	0.13	=	_____
Stormwater Planter	_____ sf	x	0.11	=	_____
Sand Filter	_____ sf	x	0.11	=	_____

Sum of Total Impervious Area Managed [ ] Box 4

(Box 4 must be equal or greater than Box 3)

Point of Discharge (check one)

Overflow to gutter (weephole)	
Overflow to public storm drain pipe	
Overflow to Open Drainage	
Subsurface Infiltration	

2014 SIM FORM: Tree Credit and Rainwater Harvesting Worksheet

See "Tree Credits" section for more information regarding the use of trees to meet Stormwater Impervious Area Reduction.

New Evergreen Trees

To receive Impervious Area Reduction Credit, new evergreen trees must be planted within 25 feet of the new or replaced impervious surfaces. New trees cannot be credited against rooftop areas. Minimum tree height **(at the time of planting)** to receive credit is 6 feet

Enter number of new evergreen trees that meet qualification requirements in Box A		Box A
Multiply Box A by 200 and enter result in Box B		Box B

New Deciduous Trees

To receive Impervious Area Reduction Credit, new large deciduous trees must be planted within 25 feet of the new or replaced impervious surfaces and new small deciduous trees must be planted within 10 feet of new or replaced impervious surfaces. New trees cannot be credited against rooftop areas. Minimum tree caliper **(at the time of planting)** to receive credit is 2 inches.

Enter number of new deciduous trees that meet qualification requirements in Box C		Box C
Multiply Box C by 100 and enter result in Box D		Box D

Existing Tree Canopy

To receive Impervious Area Reduction Credit, existing large tree canopies must be within 25 feet and existing small tree canopies must be within 10 feet of ground-level impervious surfaces (cannot be credit against roof top surfaces). Existing tree canopy credited towards Impervious Area Reduction must be preserved during and after construction throughout the life of the development. Minimum tree caliper to receive credit is 4 inches. No credit will be given to existing tree canopy located within environmental conservation areas.

Enter square footage of existing tree canopy that meet qualification requirements in Box E.		Box E
Multiply Box E by 0.5 and enter result in Box F.		Box F

Total Tree Credit

Add Boxes B, D and F and enter the result in Box G		Box G
Multiply Box 1 of Form SIM by 0.1 and enter the result in Box H.		Box H
Enter the lesser of Box G and H in Box I. (This is the amount to be entered as "Tree Credit" on Form SIM.)		Box I

SIM FORM 2014 Instructions

1. Enter square footage (sf) of total impervious area being developed into BOX 1.
2. Enter square footage (sf) for impervious area reduction techniques.
3. Enter sum of the impervious area reduction techniques into BOX 2.
4. Subtract BOX 2 from BOX 1 to find BOX 3, the amount of impervious area that requires stormwater management.
5. Select appropriate stormwater management facilities.
6. Enter the square footage of impervious area managed that will flow into each facility type.
7. Multiply each impervious area managed by the corresponding sizing factor. Enter this area as the facility surface area, This is the size of facility required to manage runoff
9. Where selecting facilities that will overflow, select the point of discharge location.
10. Enter the sum of the total of all the impervious area managed into BOX 4. BOX 4 must be greater than or equal to BOX 3.

Explanation of Proposed Amendments to the Engineering Design Standards and Procedures Manual Appendix 4A Stormwater Subsurface Filtration/Infiltration Facility Sizing Selection to Incorporate MS4 Permit Requirements

PROPOSED AMENDMENTS
Various Sections of the Engineering Manual (EDSPM) are amended to remove barriers to Low-Impact Development and define stormwater terms. Commentary is shown in *purple italics font*, preceding the text to which it is referring.

STORMWATER SUBSURFACE FILTRATION/INFILTRATION SIZING SPREADSHEET

COMMENTARY: This spreadsheet (commonly referred to as a calculator) is provided as an approved way for small developments to choose and correctly size the stormwater facilities in Springfield Development Code Appendix D Typical Stormwater Facility Details without needing a design professional. The use of this is not required. It is sourced from the City of Eugene Stormwater Management Manual and has all the proposed standards (1.4" of runoff retained on site or and equivalent runoff flow rate if infiltration is not available) built into the calculations.

Explanation of Proposed Amendments to the Engineering Design Standards and Procedures Manual Appendix 4B Stormwater Surface Filtration/Infiltration Facility Sizing Selection to Incorporate MS4 Permit Requirements

PROPOSED AMENDMENTS
Various Sections of the Engineering Manual (EDSPM) are amended to remove barriers to Low-Impact Development and define stormwater terms. Commentary is shown in *purple italics font*, preceding the text to which it is referring.

STORMWATER SURFACE FILTRATION/INFILTRATION SIZING SPREADSHEET

COMMENTARY: This spreadsheet (commonly referred to as a calculator) is provided as an approved way for small developments to choose and correctly size the stormwater facilities in Springfield Development Code Appendix D Typical stormwater facility Details without needing a design professional. The use of this is not required. It is sourced from the City of Eugene Stormwater Management Manual and has all the proposed standards (1.4" of runoff retained on site). Subsurface facilities are not suitable for flow through calculations.

Explanation of Proposed Amendments to the Engineering Design Standards and Procedures Manual Appendix 4C Stormwater Simplified Approach for Stormwater Management (SIM Form) to Incorporate MS4 Permit Requirements

PROPOSED AMENDMENTS
Various Sections of the Engineering Manual (EDSPM) are amended to remove barriers to Low-Impact Development. Commentary is shown in *purple italics font*, preceding the text to which it is referring.

STORMWATER SIMPLIFIED APPROACH FOR STORMWATER MANAGEMENT (SIM FORM)

COMMENTARY: This worksheet provides a simple method for the sizing of facilities to meet the proposed standards for a limited number of surface facilities in Springfield Development Code Appendix D typical stormwater facility details for small-scale developers and builders to use on suitable sites. It is sourced from the City of Eugene Stormwater Management Manual.

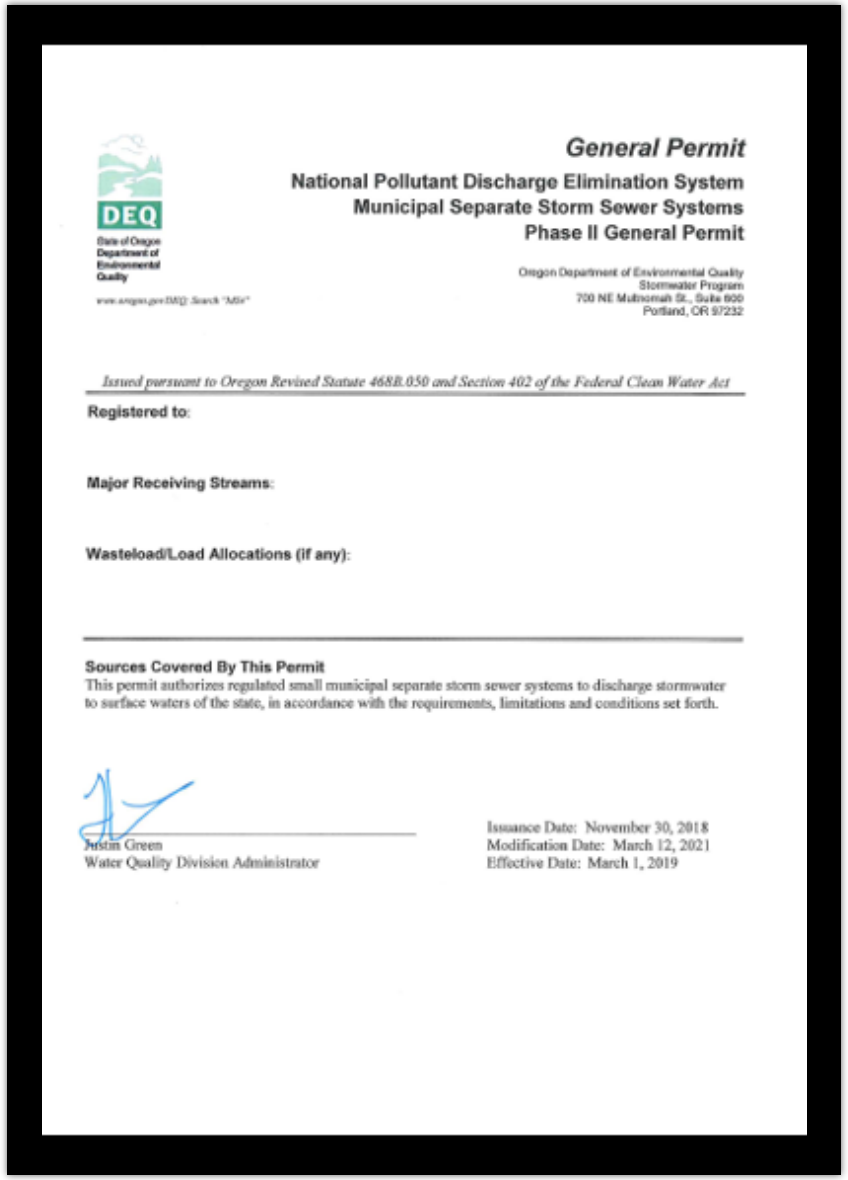
Stormwater Post-Construction Requirements Update

CITY OF SPRINGFIELD, OREGON

PROPOSED AMENDMENTS (811-23-000124-TYP4)

Springfield and Lane County Planning Commissions

9-5-2023



DEQ
State of Oregon Department of Environmental Quality

www.oregon.gov/DEQ: Search "MS4"

General Permit

National Pollutant Discharge Elimination System
Municipal Separate Storm Sewer Systems
Phase II General Permit

Oregon Department of Environmental Quality
Stormwater Program
700 NE Multnomah St., Suite 600
Portland, OR 97232

Issued pursuant to Oregon Revised Statute 468B.050 and Section 402 of the Federal Clean Water Act

Registered to:

Major Receiving Streams:

Wasteload/Load Allocations (if any):

Sources Covered By This Permit
This permit authorizes regulated small municipal separate storm sewer systems to discharge stormwater to surface waters of the state, in accordance with the requirements, limitations and conditions set forth.

Justin Green
Water Quality Division Administrator

Issuance Date: November 30, 2018
Modification Date: March 12, 2021
Effective Date: March 1, 2019

What is the MS4 Permit and why does the City have one?

- The Oregon DEQ issued a permit to the City of Springfield called a Municipal Separate Storm Sewer System (MS4) Permit.
- The permit regulates stormwater runoff from urban areas like Springfield to surface water, including the McKenzie and Willamette Rivers.
- The City of Springfield requires post-construction site runoff controls for new and re-development to mimic natural hydrology and reduce the discharge of pollutants to local waterbodies, as mandated by the MS4 Permit.

What does the MS4 Permit require?

1. Implementation Deadline
2. Size Requirements
3. Remove Barriers to LID
4. Stormwater Management Requirements
   a. Site Performance Standard
   b. Treatment Standard
5. Plan Review
6. Operation and Maintenance
7. Training and Education

What is this Stormwater Post-Construction Requirements Update request for?

The application is a Type IV Legislative Amendment to the Springfield Development Code

Amendments include various sections that involve the use of stormwater (Chapters 3, 4, 5, 6, and the Creation of Appendices). Specifically:

- Section 4.3.110 Stormwater Management
- Section 6.1.110 Meaning of Specific Words and Terms

Requires review and recommendation by the Springfield Planning Commission and the Lane County Planning Commission due to Intergovernmental Agreement.

APPROVAL CRITERIA (SDC 5.6.115)

In reaching a decision on the adoption or amendment of refinement plans and this Code's text, the City Council shall adopt findings that demonstrate conformance to the following:

1. The Metro Plan
2. Applicable State Statues; and
3. Applicable Statewide Planning Goals and Administrative Rules

Next Steps

- Planning Commissions will make a recommendation to the City Council and Board of County Commissioners.
- City Council adopts by Ordinance
- To apply outside the city limits, Lane County Board of Commissioners must co-adopt
- Joint Work Session and Public Hearing Scheduled for November 6, 2023

AGENDA ITEM SUMMARY		
	Meeting Date:	9/5/2023
	Meeting Type:	Regular Meeting
	Staff Contact/ Dept.:	Mark Rust/DPW
	Staff Phone No:	541-736-3647
	Estimated Time:	10 minutes
SPRINGFIELD PLANNING COMMISSION	**Council Goals:**	Mandate

ITEM TITLE:	ADDITIONAL MINOR CODE AMENDMENTS
ACTION REQUESTED:	No action requested. This is an informational item.
ISSUE STATEMENT:	Planning staff are sharing additional changes to the Minor Code Amendments as an informational item before they are presented to the City Council and Lane County Board of County Commissioners at a future public hearing.
ATTACHMENTS:	ATT1 –Key Changes for Minor Code Amendments
DISCUSSION:	On August 1, 2023, the Springfield and Lane County planning commissions approved recommendations to the City Council and Board of Commissioners to adopt amendments to the Springfield Development Code to make minor changes to correct errors and provide clarification on code language that was adopted as part of the 2022 Development Code Update Project. As staff continue to apply the code, they have found needed corrections that were not included in the Planning Commission's public hearing draft. These new changes are in addition to the first round of minor code changes that were before the Planning Commission and mostly correct missed internal code citations and references, typographical errors, and update naming conventions that were previously missed. Staff is sharing these amendments with the Planning Commissions so you are aware of the additional amendments that staff will be presenting to the elected officials for adoption. The proposed amendments will be reviewed as a Type 4 Legislative Amendment to the Development Code. The City Council and Board of County Commissioners will conduct a joint public hearing on these additional minor code changes in addition to the planning commissions' recommended changes.

CITY OF SPRINGFIELD
ADDITIONAL MINOR CODE AMENDMENTS

Planning Commission review – September 5, 2023

This list identifies and explains the new/additional changes proposed for sections of the Springfield Development Code (SDC) that have been identified since the public hearing on minor code changes before the Planning Commission on August 1, 2023. These changes will be included with the other changes and presented to the City Council as part of the Council public hearing process.

The package of proposed code amendments:

1) SDC 3.2.300 – Commercial Districts. Table 3.2.320 for Permitted Uses, under the "Industrial" heading, for the use of "Manufacturing or assembly of goods or products to be sold on premises" the applicable code standard reference to "SDC 4.7.145" in the table should be SDC 4.7.175 instead.

Industrial					
Manufacture or assembly of goods or products to be sold on premises	N	P*	N	N	SDC 4.7.145
Warehouse and Wholesale Sales	N	P*	N	N	SDC 4.7.245

2) SDC 3.2.300 – Commercial Districts. Table 3.2.320 for Permitted Uses. In the existing Minor Code Changes, we are/were proposing to delete the reference to "SDC 4.7.145" in the "Applicable code standards" column, for the use of "Secondary Use" under the "Other" heading. Instead of deleting this reference, it should be changed to "SDC 4.7.320" instead. This applicable code standard is only applicable to the GO land use district.

Other					
Secondary Use (as defined)	P	D	D	P*	SDC 4.7.145

3) SDC 6.1.110, the definition of "Yard, Through-Lot/Parcel Rear Yard" has a minor typo in it that needs to be changed. The word "this" should be "that". "…street right-of-way <u>that</u> is parallel…"

Yard, Through-Lot/Parcel Rear Yard. The first 10 feet of land paralleling street right-of-way this is parallel to and most distant from the front yard *property* boundary used for address purposes.

4) SDC 3.2.325 Commercial Districts. SDC 3.2.325(B)(3)(a)(i)(A) for building setbacks needs to be modified. The current code setback requirement is 10 feet

for all setbacks (front, side, rear, etc.). In the code prior to the comprehensive update in 2022, this 10-foot setback requirement was only applicable to “front, street side yead, and through lot rear yard” setbacks. Also, language was left out for “interior side, rear yard setbacks when abutting residential or CI Districts”, these setbacks should be 10 feet. This change will allow the previous zero setback for side and rear yards.

This is the existing language in the newly updated code.

(B) Setbacks.

(1) *Setbacks provide separation between commercial and non-commercial uses for fire protection/security, building maintenance, sunlight and air circulation, noise buffering, and visual separation. All developments must meet applicable fire and building code standards, which may require greater setbacks than those listed in this section (e.g., for combustible materials, etc.).*

(2) *Required setbacks are measured from the special street setback in SDC 4.2.105(N), where applicable.*

(3) *The following setback standards apply to all structures, except as otherwise provided by this section.*

(a) Building Setback.

(i) *All commercial districts (NC, CC, MRC, and GO).*

A. *The minimum building setback is 10 feet.*

(b) Parking, Driveway, or Outdoor Storage Setback.

(i) Neighborhood Commercial. *The minimum yard setback for parking, driveway, or outdoor storage is 7 feet from any property line.*

(ii) *Other commercial districts (CC, MRC, and GO). The minimum yard setback for parking, driveway, or outdoor storage is 5 feet from any property line.*

(c) Setback Exceptions.

(i) *There are no setbacks required for buildings in the Downtown Exception Area.*

(ii) *Architectural extensions may extend into any 5-foot or larger setback by no more than 2 feet.*

Table 3.2.325(B) summarizes the above setback standards, subject to the exceptions above.

Table 3.2.325(B) Setback Standards				
Development Standard	***NC***	***CC***	***MRC***	***GO***
Setback for building	*10 feet*	*10 feet*	*10 feet*	*10 feet*

Setback for parking, driveway, or outdoor storage	*7 feet*	*5 feet*	*5 feet*	*5 feet*

The existing language of SDC 3.2.325(B)(3)(a) and existing table 3.2.325(B) should be replaced with the following:

(3) The following setback standards apply to all structures, except as otherwise provided by this section.

(a) **Front, Street Side Yard, and Through Lot Rear Building Setback.**

(i) All commercial districts (NC, CC, MRC, and GO).

A. The minimum building setback is 10 feet.

(b) **Interior Side, Rear Yard Building Setback.**

(i) All commercial districts (NC, CC, MRC, and GO)

A. The building setback is zero, except when abutting residential or CI district, the building setback is 10 feet.

(c) **Parking, Driveway, or Outdoor Storage Setback.**

(i) **Neighborhood Commercial.** The minimum yard setback for parking, driveway, or outdoor storage is 7 feet from any property line.

(ii) Other commercial districts (CC, MRC, and GO). The minimum yard setback for parking, driveway, or outdoor storage is 5 feet from any property line.

(d~~c~~) **Setback Exceptions.**

(i) There are no setbacks required for buildings in the Downtown Exception Area.

(ii) Architectural extensions may extend into any 5-foot or larger setback by no more than 2 feet.

Table 3.2.325(B) summarizes the above setback standards.

Table 3.2.325(B) Setback Standards				
Development Standard	**NC**	**CC**	**MRC**	**GO**
Front, Street Side Yard, and Through Lot Rear				
Building Setback	10 feet	10 feet	10 feet	10 feet
Setback for parking, driveway, or outdoor storage	7 feet	5 feet	5 feet	5 feet
Interior Side, Rear Year Setbacks				

Building setback	0 feet	0 feet	0 feet	0 feet
Setback for parking, driveway, or outdoor storage	7 feet	5 feet	5 feet	5 feet
Interior Side, Rear Year Setbacks when abutting residential or CI district				
Building setback	10 feet	10 feet	10 feet	10 feet

5) SDC 3.2.615 – Mixed Use Zoning Districts, Base Zone Mixed-Use Development Standards. Table 3.2.615 lists the Development Standards for the Mixed Use Districts. For the "Landscape Setbacks" the code references for the MUR district are incorrect and need to be updated. The current references are to SDC 3.2.215 and 3.2.225. These need to be updated to SDC 3.2.220 and 3.2.230 respectively.

Additionally, the references to LDR and MDR need to be changed to R-1 and R-2 for consistency.

Development Standard	***MUC***	***MUE***	***MUR***
Landscaped Setbacks(2), (3), (4) and (5)			
Front, Street Side Yard, and Through Lot/Parcel Rear Yard			
Building Setback	None	10 feet	See SDC ~~3.2.215~~ 3.2.220
Parking, driveway, and outdoor storage setback	5 feet	5 feet	See SDC ~~3.2.215~~ 3.2.220
Interior Side, Rear Yard Setbacks when Abutting Residential or CI Districts			
Building Setback	10 feet	10 feet	See SDC ~~3.2.215~~ 3.2.220
Parking, Driveway, Outdoor Storage Setback	5 feet	5 feet	See SDC ~~3.2.215~~ 3.2.220
Maximum Building Height (6**)**			
Maximum unless abutting residential districts (See below)	90 feet	60 feet	60 feet

Development Standard	***MUC***	***MUE***	***MUR***
When abutting an R-1~~LDR~~, R-2~~MDR~~, or MUR District to the north	Defined by the Maximum Shade Point Height requirement of SDC 3.2.225(A)(1)(b), or up to 50 feet south of a northern lot/parcel line a plane extending south with an angle of 23 degrees and originating from the top of a 16 foot hypothetical fence located on the northern lot/parcel line.		See SDC ~~3.2.225~~ 3.2.230
When abutting an R-1, R-2~~LDR, MDR~~, or MUR District to the east, west, or south	No greater than that permitted in the R-1~~LDR~~ or R-2~~MDR~~ Districts for a distance of 50 feet.		See SDC ~~3.2.225~~ 3.2.230

6) SDC 5.17.115(H) for a Phased Development Plan within a Site Plan process has a couple of old citations that need to be changed as follows:

(H) Phased Development Plan. The application must include a Phased Development Plan if phasing is proposed. The plan must indicate any proposed phases for development, including the boundaries and sequencing of each phase ~~as specified in SDC 5.17.115~~. Phasing must progress in a sequence that promotes street connectivity between the various phases and accommodates other required public improvements, including but not limited to, sanitary sewer, stormwater management, water, and electricity. The Approval Authority may require the applicant to enter into an agreement for phased developments, and may require bonding or other assurances for improvements, in accordance with SDC 5.17.135(E)~~5.15.135, Bonding and Assurances for Development~~.