



Low Impact Development Construction, Inspection & Maintenance Guide

Edmonton

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PREFACE

Low Impact Development (LID) practices are increasingly used to protect water quality and build sustainable cities. LID is a land development and stormwater management approach that strives to mimic pre-development hydrologic processes to manage stormwater and restore natural features. This approach requires the integration of multiple disciplines and techniques throughout the life cycle of LID facilities to ensure the performance and longevity of these features.

The *LID Construction, Inspection, and Maintenance Guide* (the Guide) provides guidelines and recommendations on tendering, construction, project acceptance inspection, warranty period maintenance, and on-going inspection and maintenance of five types of LID features including bioretention, bioswale, box planter, naturalized drainage way, and permeable pavement. This *Guide* is intended to inform individuals involved in all phases of the LID construction and post-construction life cycle. This includes municipal staff, project managers, developers, designers, contractors, inspectors, and operation and maintenance personnel.

This Guide is a living document and will be updated as needed. It is recommended that this document be used in conjunction with the latest version of the *LID Best Management Practices Design Guide* which covers aspects including LID site planning, design guidelines and the functions of LID facilities. The relevant requirements for stormwater management as set out in City drainage bylaws, Design & Construction Standards and other pertinent legislation remain applicable to LID. Discussions with applicable City of Edmonton departments are recommended to start early to ensure mutual understanding of project acceptance requirements and on-going maintenance needs.

The Guide was drafted in January 2016 by Urban Systems Ltd. with assistance from the Center for Watershed Protection and Kinnikinnick Studio Inc. and with inputs from various stakeholder groups. Participation by City business areas including Parks, Drainage, Planning, Transportation, Buildings, and Landscapes, as well as external stakeholders including UDI representatives, contractors, and consultants is acknowledged.

Comments and questions regarding this Guide should be directed to lid@edmonton.ca.

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1 INTRODUCTION

1.1 Purpose/Objective

Successful implementation of Low Impact Development (LID) requires a collaborative, interdisciplinary, knowledgeable and experienced team, from the onset of the project through to regular operation and maintenance of the facility.

The LID community has seen many facilities facing issues related to construction techniques, facility operation and ongoing facility maintenance. This document is intended to serve as a practical, concise and user-friendly guide for the construction, inspection and on-going maintenance of “in-the-ground” type LID facilities in Edmonton. The Guide covers bioretention, bioswale, box planter, permeable pavement and naturalized drainage way facilities; all of which are described in the City’s *Low Impact Development Best Practices Design Guide* (Edition 1.1; December 2014). The next few paragraphs provide brief descriptions of the intent and function of all five of these LID facilities.

1.2 Intended Audience

This Guide is intended to inform individuals involved in all phases of the LID construction and post-construction life cycle. This includes municipal staff, developers, designers, contractors and operation and maintenance personnel.

1.3 How to Use This Guide

This Guide describes general and specific practices relating to the construction, inspection and maintenance of LID facilities. **Section 1** provides an introduction to the Guide that includes information on roles and responsibilities and facility intent and function. **Section 2** provides a list of existing City documents that serve as companion resources to the Guide. **Section 3** is intended to aid design team members during the tendering and pre-construction phase of the project. The majority of the content is organized around three main sections, Construction (**Section 4**), Project Acceptance (**Section 5**) and Maintenance (**Section 6**). The Construction section includes general considerations as well as sequencing and tasks specific to building each facility type. The Project Acceptance section encompasses the issuance of a construction completion certificate (CCC), the warranty maintenance period and issuance of a final acceptance certificate (FAC). The Maintenance section includes general maintenance considerations and activities as well as inspection points and potential issues/solutions for each facility type. The Guide includes a variety of supporting figures, tables and photos to support the text presented herein.

1.4 Roles and Responsibilities

As with any constructed facility, it is critical that the roles related to the construction, inspection and maintenance of LID facilities be clearly defined and understood by all parties. Overall, the respective roles of the contractor, consultant, and City departments are outlined here. This section provides a general overview of their associated responsibilities.

The term “**Owner’s Representative**” is used in this Guide because a project may be initiated by a private developer or City Capital Works. For private projects, the Owner’s Representative would normally be the lead consultant (engineer or landscape architect) overseeing construction. For City projects, the Owner’s Representative may be the City project manager or a lead consultant designated by the City.

Drainage is the “**Primary Approving Authority**” for all LID facilities that are owned by the City, directly connected to City drainage infrastructure or for which the City will assume responsibility. The Primary Approving Authority identifies which LID inspectors are needed, coordinates inspections and takes responsibility for final sign-off on the facility.

LID inspectors will be identified based on the specific elements included in each LID facility, as summarized in **Table 1**.

Table 1. Inspection Responsibilities for Specific LID Elements

LID Element	Inspection Responsibility
Shrubs and herbaceous material, mulch, seed, turf and soils	Parks
Trees	Urban Forestry
Underdrains, catchbasins, inlets/outlet structures, riprap	Drainage
Curbs, curb cuts, trail/street surfaces and permeable pavement	Transportation

1.4.1 **Pre-Construction**

Prior to the start of construction, it is the responsibility of the Owner’s Representative to host a pre-construction meeting with the Contractor, Primary Approving Authority and Inspectors to discuss facility purpose, site access, schedule, construction plan, testing measures, material storage, and ESC measures.

Primary Responsibility: *Owner’s Representative*

Mandatory Participation: *Owner’s Representative, Contractor, Primary Approving Authority*

Optional Participation: *other LID Inspectors*

1.4.2 **Construction**

All construction inspections are the responsibility of the Owner’s Representative. The Owner’s Representative must have sufficient expertise (e.g. engineer, landscape architect) to ensure that all LID elements are constructed correctly. At their discretion, the Owner’s Representative is encouraged to include City inspectors at key stages (e.g. during approval of plant material and installation).

Primary Responsibility: *Owner’s Representative*

Mandatory Participation: *Owner’s Representative, Contractor*

Optional Participation: *other LID Inspectors*

1.4.3 **Project Acceptance (CCC through FAC)**

1.4.3.1 **Construction Completion Certificate (CCC)**

Drainage is the **Primary Approving Authority** for issuance of CCCs for all LID facilities that are owned by the City, directly connected to City drainage infrastructure or for which the City will assume responsibility upon acceptance, coordinating the necessary inspections and signing off on the certificate.

Primary Responsibility: *Drainage (Primary Approving Authority)*

Secondary Responsibility: *Designated LID Inspectors*

Mandatory Participation: *Owner’s Representative, Contractor, Primary Approving Authority, and other LID Inspectors*

1.4.3.2 **Warranty Period Maintenance**

The **Contractor** is responsible for completing all necessary maintenance during the warranty period under the guidance of the **Owner’s Representative**.

Primary Responsibility: *Contractor*

Mandatory Participation: *Owner’s Representative*

1.4.3.3 Final Acceptance Certificate (FAC)

Drainage is the **Primary Approving Authority** for issuance of FACs for all LID facilities owned by the City, directly connected to City drainage infrastructure or for which the City will assume responsibility upon acceptance, coordinating the necessary inspections and signing off on the certificate.

Primary Responsibility: *Drainage (Primary Approving Authority)*

Secondary Responsibility: *Designated LID inspectors*

Mandatory Participation: *Owner's Representative, Contractor, Primary Approving Authority, and other LID Inspectors*

1.4.4 Maintenance

Maintenance of City LID facilities after FAC is a shared responsibility among Drainage, Parks and Transportation, as summarized in **Table 2**. This table provides an overview of general responsibilities, specific maintenance activities (with suggested frequency and responsible party) for each type of LID facility; however, these activities and responsibilities are fully described in **Section 6**. While maintenance of privately-owned LID facilities is the responsibility of the owner, the information provided in Section 6 can also be implemented by private maintenance crews.

Table 2. Maintenance Responsibilities Overview

Role	Responsibility
<ul style="list-style-type: none"> • Maintain density, health and aesthetics of shrubs, trees, herbaceous material and turf (e.g. weeding, plant replacement, watering, mowing*) • Maintain soils and mulch (e.g. raking, top-ups) • Control pests • Remove debris and/or sediment* 	Parks and Urban Forestry
<ul style="list-style-type: none"> • Flush underdrain systems • Clean catchbasins • Maintain and repair inlet and outlet structures • Maintain and repair riprap 	Drainage
<ul style="list-style-type: none"> • Conduct street sweeping • Mow grass swales in ROWs • Maintain/repair curbs and curb cuts • Remove debris and/or sediment from grass swales in ROWs 	Transportation

*EXCEPTION: grass swales (ditches) in ROW to be mowed and cleaned by Transportation maintenance crews, as per road maintenance schedule.

1.5 Facility Intent and Function

The following sections provide a brief overview and description of the five types of facilities covered in this Guide.

1.5.1 Bioretention

Bioretention cells are stormwater management and treatment facilities that use vegetation and amended topsoil to filter, treat, and attenuate stormwater runoff close to its source (e.g. roofs, roads, parking lots, driveways and sidewalks). Stormwater runoff is directed into the bioretention cell where dense vegetation reduces the velocity of the runoff and facilitates the infiltration of water into the soil; large particles and debris are filtered out of the stormwater on the surface with additional treatment of suspended pollutants occurring in the amended soil.

Typical subsurface components of the bioretention facility include gravel drainage layers and perforated pipe to convey excess moisture to downstream stormwater management facilities. This prevents standing water or saturated soil within the bioretention area. Pre-treatment facilities may also be incorporated.



Roadside rain garden.



Stabilized drainage area.



Densely vegetated facility.



Urbanized rain garden.

1.5.2 Bioswale

Bioswales are densely planted with vegetation, include enhanced topsoil and an underlying drainage layer (if the native soil infiltration rate is low). They are designed to slow down, treat and convey stormwater runoff. The increased time required to pass through the facility allows for increased soil moisture, more evaporation and transpiration and enhanced water quality prior to the runoff entering another stormwater management facility. The ability of the soil to absorb moisture is a significant component of a successful, functional bioswale facility.



Bioswale with thriving trees.



Parking lot bioswale.



Dense, aesthetically pleasing vegetation.



Parking lot bioswale.

1.5.3 *Naturalized Drainage Way*

Naturalized drainage ways use wetland zones, grade control structures, and native vegetation to replace storm sewer mains, restore urban creeks and prevent erosion of existing drainage ways. They generally have frequent or continuous flowing water present, even during periods of little or no precipitation. Natural wetland and riparian vegetation and grade control structures help reduce runoff velocities as water flows through them. Native soils and vegetation incorporated into the drainage way are crucial to promote the hydrologic cycle through infiltration, evaporation and transpiration. These facilities are also generally viewed as amenities that provide value to surrounding communities, by creating refuge for birds and wildlife in the area and by providing connections between natural areas and greenspaces.



Naturalized drainage way with continuous flowing water.



Naturalized drainage way with check dams.

1.5.4 *Box Planter*

Box planters are typically designed to treat frequent, smaller volume rainfall events, facilitating evapo-transpiration, and providing filtration for water quality treatment. Box planters are also called stormwater planters, foundation planters, extended tree pits, soil cells, street tree cells, stormwater curb extensions, sidewalk planters and urban bioretention facilities. A traditional planter typically consists of a concrete box, which may or may not have a lined or concrete bottom (depending on whether infiltration is desirable), filled with a soil medium and planted with trees, shrubs or flowers. There are three types of box planters that may be implemented based on site characteristics and requirements:

- contained planters with outlet only through overflow
- flow-through planters with an under-drain outlet
- infiltration planters that drain through deep infiltration and groundwater recharge

A fourth planter type, an alternative to the concrete box, is a matrix of buried plastic cells that can be assembled to any required shape and size. The matrix is filled with soil and provides structural support for sidewalks and roadways while allowing for deep tree root establishment and stormwater interception.



Flow-through style facility



Buried plastic cells

1.5.5 Permeable Pavement

Permeable pavement is a term that encompasses a family of products that either allow stormwater to pass through a highly porous roadway material or through spacing between pavers. Products in the permeable pavement family include permeable asphalt, porous concrete, interlocking paver units and open-celled grid filled with either gravel or grass and soil media. Permeable pavement allows stormwater to seep through the surface into a subsurface drainage layer. The subsurface drainage layer provides water quality improvement through filtration and delays runoff entering downstream stormwater facilities.

Well maintained facilities have been shown to reduce icing during the winter and standing water during and following storm events. In some locations permeable pavement can be used as an infiltration facility, promoting groundwater recharge.



Porous concrete – dry conditions



Grass pavers – dry conditions



Interlocking pavers – wet conditions



Permeable asphalt in foreground, traditional in background – wet conditions

2 COMPANION RESOURCES

2.1 Standards and Guidelines

LID construction practices incorporate many practices which are already standard on all construction sites in the City of Edmonton. The content herein focuses on construction practices and considerations which are specific to LID facilities. In addition to standard construction protocols and environmental regulations, which must still be followed, the Guide is intended to be used in conjunction with the following City resources:

- [Low Impact Development Best Practices Design Guide v1.1](#)
- [Design and Construction Standards](#)
- [Erosion and Sedimentation Control Guidelines](#)
- [Erosion and Sedimentation Control Field Manual](#)
- [Safe Disposal of Concrete and Cement-Based Products: A Guideline for Businesses and Individuals](#)
- [Policy C456A Corporate Tree Management](#)
- [Tree Protection: Hoarding Requirements](#)
- [Tree Preservation: Protecting and Caring for our City's Trees](#)
- [Trees & Construction](#)
- [Guideline for Evaluation of Trees](#)

2.2 Checklists

A series of checklists have been developed to be used in conjunction with this Guide. Each of the five LID facilities has a separate checklist for each of the checklists presented below.

- Construction Inspection Checklists – For use by the **Owner’s Representative(s)**, a construction inspection checklist is a recommended resource to use in addition to typical inspection reports during construction. It provides detail on construction sequencing and ensures best practices are followed during LID installation.
- CCC Checklists – For use by **City inspectors** or the **Owner’s Representative** during CCC inspections, and by **Owner’s Representative(s)** in the pre-CCC inspection process. The CCC checklist is a tool to help identify deficiencies and is to be used in conjunction with existing CCC forms and completed by designated individuals prior to issuance of CCC.
- FAC Checklists – For use by **City inspectors** or the **Owner’s Representative** during FAC inspections and by **Owner’s Representative(s)** in the pre-FAC inspection process. The FAC checklist is a tool to help identify deficiencies and is to be used in conjunction with existing FAC forms and completed by designated individuals prior to issuance of FAC.
- Maintenance Checklists – For use by **Contractor** during the warranty period and by **City or private maintenance crews** after FAC, the maintenance checklist will serve as a maintenance inspection form. It provides a comprehensive list of inspection points and rating criteria for deficiencies.

For both City owned and privately owned facilities, the **Owner’s Representative** will perform facility CCC and FAC pre-inspections.

For City owned facilities, **City inspectors** will perform CCC and FAC inspections and **City maintenance crews** will perform post-FAC maintenance.

For privately owned facilities, the **Owner’s Representative** will perform CCC and FAC inspections and **private maintenance crews** will perform post-FAC maintenance.

The checklists are located in **Appendix A**.

3 TENDERING AND PRE-CONSTRUCTION

3.1 Tendering

The following amendments to standard contract front end and supplemental specifications are recommended to avoid common issues that arise during construction of LID facilities:

- **Recommended pre-bid meeting:** host a mandatory pre-bid meeting to attract serious qualified bidders and provide an opportunity to discuss project details. Use the pre-bid meeting to specifically point out and reinforce any unique project requirements included in the contract and specifications such as past experience, training, amended soil specifications, contractor responsibilities during maintenance period and key stages of approval process
- **Past experience:** consider requiring bidding contractors to be prequalified in the installation and maintenance of LID facilities
- **LID training:** require bidding contractors to have taken training in the design, installation and maintenance of LID facilities; this may be considered a substitute for actual LID construction experience
- **Amended soil:** include the following in a special provision for the City of Edmonton Section 02910 Topsoil, to ensure the specified soil mixture is provided and installed without delay to the project and/or adding additional expense to construction management:
 - Require contractor to provide source of supply of soil and amendments within 5 days of contract award; recommend use of local soil supplier(s) (if possible) who have provided amended soil in past projects if not being obtained from designated City stockpiles
 - Require contractor to provide soil test results for **all** soils to be installed on the project, regardless of whether the soil was obtained from a non-approved City source or alternate source
 - The current City specification requires soil test results to be approved in writing prior to installation of topsoil. Include a supporting clause that if an analysis, performed by the Owner's Representative, on placed soil does not meet the specification, any costs due to re-work resulting from failed topsoil will be incurred by the Contractor. This could include removal and replacement of mulch, soil, plant material, and any other site works affected

3.2 Pre-construction

There are several basic, but critical steps recommended to be undertaken prior to initiating construction of an LID facility to ensure its success. Activities include holding a pre-construction meeting and site preparation activities. Recommended tasks, timing and responsibilities are presented in **Table 3**.

Table 3. Typical Pre-Construction Tasks for LID Facilities

Task	How to Implement	Purpose	Inspection Items	Timing	Responsibility	Potential Action Required
Pre-construction						
Hold a pre-construction meeting.	<p>Conduct a meeting between the project owner and/or owner's representative, contractor, and City.</p> <p>Confirm the design intent and function of the facility, roles and responsibilities and lines of communication.</p> <p>Identify access routes and staging areas.</p> <p>Communicate measures to plan for weather or material delays and to preserve material integrity.</p>	<p>Understanding of facility intent will help avoid construction techniques that may damage the facility.</p> <p>Clear roles and responsibilities and lines of communication will assist in quickly and effectively resolving issues that arise.</p>	<p>Meeting has taken place.</p> <p>A site inspector has been identified.</p>	Before construction begins.	Owner's Representative will set up and host meeting.	Circulate meeting minutes.
Site Preparation						
Stabilize contributing drainage area and install ESC.	Identify existing overland flow routes and ensure that surfaces are stable and protected with ESC measures or divert flow as required to prevent erosion and sedimentation of the facility.	<p>Significant costs are associated with materials and labour required to remediate degraded facility soils (via compaction or sedimentation).</p> <p>Remediation may include removal and replacement of mulch, vegetation and contaminated soil at the contractor's expense.</p> <p>If the facility drains directly into a water body or sensitive area, release of sediment laden runoff could have negative environmental impacts.</p>	<p>Contributing drainage area is stabilized.</p> <p>Drainage routes are diverted, if applicable.</p> <p>ESC is installed to City standard in the proper locations.</p>	<p>Before construction begins.</p> <p>Once ESC has been installed.</p>	<p>Contractor to implement.</p> <p>Owner's Representative (engineering and landscape inspectors recommended) to confirm.</p>	<p>Identify areas that require stabilization.</p> <p>Instruct contractor to install additional ESC.</p> <p>Instruct contractor to install ESC to City standard.</p>
Take measures to protect habitat, air and water quality, and existing vegetation.	Identify sensitive areas and implement measures (e.g. clear marking, fencing, and signage) to ensure they are not disturbed during construction.	Project implementation results in a net positive environmental impact.	<p>Construction activities are kept an appropriate distance away from any marked areas.</p> <p>Protection is installed and/or carried out to the City standard.</p>	<p>Before construction begins.</p> <p>Once protective measures have been installed and/or put into action.</p>	<p>Contractor to implement.</p> <p>Owner's Representative (engineering and landscape) to confirm.</p> <p>City Representative from Urban Forestry (to review protection of existing tree stands).</p>	<p>Identify appropriate staging and laydown areas.</p> <p>Instruct contractor to install additional protective measures.</p>
Delineate site access and working areas.	Delineate access and drive routes, stockpile locations and avoidance zones with high visibility material.	Clearly marked avoidance zones will prevent facility compaction and contamination (and associated remediation costs).	Areas are clearly delineated.	Before construction begins.	<p>Contractor to implement.</p> <p>Owner's Representative to confirm.</p>	Any missed or improperly delineated areas must be corrected and marked.
Test infiltration rate of existing site soils.	Confirm soil infiltration rate at location of the LID facility using in-situ infiltration testing equipment.	<p>Typically, applicable to multi-facility installations where the infiltration rate has not been tested at the location of every facility.</p> <p>If the facility is designed for infiltration, the existing soil must be tested for consistency with design infiltration rates. Facilities located on soil with infiltration rates <13mm/hr require an underdrain.</p>	Soil has been tested and matches design infiltration rates.	Prior to construction, once facility location has been delineated.	Contractor to perform testing and submit results to the Owner's Representative for review.	Contact design team if infiltration rates are less than design assumption.

4 CONSTRUCTION

4.1 Communication

A key component of the construction phase is communication. This ensures that all invested parties have an awareness and understanding of best practices around LID facilities and can work towards maintaining the integrity of LID facilities.

4.1.1 Initial Site Meeting

The Owner's Representative must host an initial site meeting with the Contractor, Primary Approving Authority, inspectors and any other invested parties. The purpose of this meeting (specific to LID) is to:

- Ensure all parties understand the intended function of the LID facility
- Identify sensitive locations
- Review construction sequencing including: (1) LID facility construction and (2) the timing of LID construction in the context of overall site works
- Discuss adjustments to traditional methods of construction operation required for LID installation
- Ensure all parties are aware of the schedules, checkpoints, inspections and signoff required for each LID facility throughout construction life cycle

4.1.2 Utilities Coordination

Communicate the following information to all utility contractors that are to be on-site during the installation of the LID facility:

- Location and extent of stockpiles and importance of preventing contamination
- Location and extent of the LID facility, and flow paths to the facility, and importance of avoidance and preventing contamination
- Laydown/staging areas
- 'No compaction' and 'no drive' zones
- Consequences for non-conformance with 'no compaction' and 'no drive' zones

4.2 Working On-Site

This section outlines best practices related to working on or around an LID construction site.

4.2.1 Sequencing

Review the proposed LID works in the context of overall construction sequencing on site and implement the following:

- If possible, construct LID facilities last to avoid potential compaction, contamination or other degradation of the facility as a result of surrounding work. If this is not possible, consider how other activities may impact LID facilities and

plan construction to prevent contamination or compaction of infiltration media or other adverse effects

- Keep LID sites outside of the limit of disturbance until facility construction begins
- Plan construction timelines to account for poor weather, material delivery, testing delays, product familiarization and non-standard construction procedures

4.2.2 *Staging Considerations*

If LID facilities represent a component of a large development project, staging is an important consideration:

- Consider staging stripping and grading works to minimize the extent of exposed soil
- Coordinate the construction of LID facilities to reduce likelihood of contamination. If possible, construct LID facilities last. If this is not possible, keep the facility offline and divert runoff around it during the construction period
- Consider the use of sod in some LID facilities as a temporary surface cover until the contributing drainage area is stabilized and erosion potential is minimized
- If multiple facilities are constructed several weeks apart, conduct material testing for each facility separately

4.2.3 *Equipment*

Select construction tools and equipment which will not negatively impact facility function:

- Select equipment with sufficient reach to enable work to be performed from the sides/perimeter of the facility
- Lightweight, wide track vehicles minimize unwanted compaction
- Toothed bucket or ripper tools facilitate scarification
- Soil slinger trucks enable soil placement from outside of the facility and reduce the likelihood of soil contamination
- Sheet material (e.g. plywood) should be used (for standing on) to avoid additional unwanted compaction when working with amended soils

4.2.4 *Avoiding Compaction*

For amended soil media in all facilities, and subgrade soils of infiltration facilities, compaction may reduce infiltration rates and adversely affect the function of the LID facility. As such, it is critical to identify and protect 'no compaction zones' prior to construction start. Consider these actions to avoid soil compaction:

- Use barriers, signage and/or flagging to delineate 'no compaction zones'
- Review 'no compaction zones' with all parties entering the site

- Limit vehicular access near LID facilities to necessary traffic only during facility construction. Locate construction laydown areas as close to the construction site as possible to avoid unnecessary compaction
- Include ‘no compaction’ discussion within daily site meeting agenda to reinforce its importance
- If soil compaction occurs, compacted soil media may be corrected by scarifying to a depth of 300mm

4.2.5 Preventing Contamination

Measures must be taken to mitigate the risk of soil contamination during the construction of LID facilities. The following is recommended:

- Phase construction to minimize the length of time that excavated areas are left open. This reduces the risk of soil contamination and the potential for clay build-up on top of the excavated surface
- Designate concrete wash-out areas, away or isolated from the LID facility. Follow guidelines laid out in the City’s *Safe Disposal of Concrete and Cement-Based Products: A Guideline for Businesses and Individuals*

4.2.6 Erosion and Sediment Control

In addition to the requirements in the City’s *Erosion and Sedimentation Control Guidelines*, implement practices which safeguard LID facilities during construction:

- Do not use LID facilities as temporary sediment basins during construction
- Runoff (e.g. overland, roof drain leaders) should be directed around facilities until stabilized
- Select ESC measures which emphasize a focus on site erosion control (i.e. perimeter practices which simply impede and collect mobile sediment are not sufficient)
- Establish ESC measures to protect future infiltration zones from contamination and mixing with undesirable soils
- Conduct weekly documented ESC inspections until site stabilization is achieved
- ESC practices should be inspected and repaired immediately following every rainfall
- Line catch basin inlets to LID facilities with approved protective product (e.g. monofilament filter fabric) before excavation begins
- Immediately remove any excess dirt or material from paved surfaces in the contributing drainage area or in close proximity to facilities to prevent entry of sediments

4.2.7 *Site Clearing*

Stage site clearing to limit disturbance to areas less than 0.4 ha (1 acre) and where work is being performed for the next 2 weeks.

4.2.8 *Grading*

As with any drainage feature, good grading is integral to the performance of an LID facility. The following actions will help achieve desired functionality:

- Identify critical connection points to LID features (curb cuts, inlets and outlets) for finish grading contractors to ensure positive drainage
- Plan and account for the depth of surface treatment (sod, mulch, cobble or riprap) within the LID facility and contributing drainage area to ensure that these final elements are being used to achieve finished grade and will not block inlets or outlets

4.2.9 *Facility Commissioning*

Keep LID facilities offline (i.e. not receiving runoff) until the entire site is stabilized (e.g. vegetative cover is established). This can be accomplished by blocking curb cuts or inlets (to redirect runoff) and restricting facility access via Jersey barrier or fencing. For plant material, one to two month establishment time is recommended before facilities go on-line. If plant material is started from seed, a full growing season is typically needed. Depending on the season and weather, plants may need to be watered for successful establishment.

4.2.10 *Winter Considerations*

If site is not fully stabilized moving into the winter months, employ temporary means such as vegetative cover, compost blanket or approved matting (hard surfaces should be avoided) to protect the facility. Inspect facility after snowmelt events (typically when temperatures rise above 4°C). If the facility will be online over the winter, ensure the drainage area is stable and pre-treatment and/or inlets are installed and functional.

4.3 *Working with Materials*

This section outlines best practices to prepare and install specific materials within an LID facility.

4.3.1 *Material Substitution*

Substitutions can negatively impact how an LID facility is intended to function. Avoid material substitutions unless it has been reviewed and approved by the Owner's Representative and the City inspector.

4.3.2 *Material Storage*

If possible, do not store plant material, vegetative cover or soil media on site. Schedule delivery of these materials to coincide with installation timing. If this is not possible, prepare protected storage and laydown areas prior to material arrival. Extended on-

site storage (greater than 2 days) increases the likelihood of contamination and is not recommended.

If on-site storage is required, place material stockpiles more than 3 metres from the curb and immediately install ESC measures. Remove all excess material (not needed for backfill) immediately.

4.3.3 Amended Soil Media

The following construction practices will promote integrity of the soil media and contribute to the functionality and longevity of LID facilities:

- Whenever possible, leave site soil undisturbed
- If either native soils or imported soil media are to be used, complete soil amendments offsite prior to delivery to prevent contamination
- Schedule delivery of soil media to coincide with installation
- Once installed, immediately prepare the soil media to receive plantings to reduce pollutants and the need for control erosion
- If soil media will not immediately receive plantings, cover the surface (e.g. temporary tarping, plywood, sacrificial sod or geotextile) to protect it in the interim
- Restrict all vehicular traffic from the installed soil media. If this is unavoidable, ensure a protective cover (e.g. plywood) is used to reduce compaction of the material. Compacted soil media may be corrected by scarifying to a depth of 300mm
- Test media before delivery to site in accordance with the following practices:
 - Test at least two weeks before soil will be needed as attaining a passing soil mix can take up to 2 weeks and may affect scheduling
 - Test pile in 3 locations (bottom, middle and top of pile) and retest if tests come back with borderline results
 - Ensure fines are optimal per design specifications
 - If organic content is low, this may be deemed acceptable (at inspector's discretion) as it will increase over time

4.3.4 Aggregate

Aggregate is an integral component of LID facilities and specified material gradations must be closely adhered to during construction. Avoid using recycled materials (e.g. glass, recycled asphalt, crushed concrete and roofing shingles) or limestone rock in facilities at installation and if material is replaced in the future. Limestone can be especially detrimental to LID facilities as it is more susceptible to abrasion than granitic rock and can generate fines which clog the facility and potentially affect soil pH. If limestone is used, perform additional aggregate abrasion testing (via Los Angeles Rattler testing) and obtain approval of Owner's Representative before placement.

4.3.5 *Vegetation*

Plantings within an LID facility are integral to its function and specifications must be adhered to closely. To facilitate this, the Owner's Representative must be on site to approve plant material prior to installation. It is further suggested that the City inspector also be invited to site to review plants and monitor installation.

Install plantings in accordance with standard procedures and remove excess soil media from the facility so the final grade is not affected.

4.4 Facility Specific Construction

The five LID facility types have been categorized into two broad groups, vegetated facilities and permeable pavement facilities. The vegetated category is inclusive of bioretention, bioswale, naturalized drainage way and box planter facilities. The permeable pavement category is inclusive of all four sub-types of permeable pavement.

4.4.1 Vegetated Facilities

In order to reduce redundancy, construction guidance for vegetated facilities has been presented in two groups. The first grouping combines bioretention, bioswale and naturalized drainage way facilities. The second grouping encompasses all four box planter sub-types.

4.4.1.1 Bioretention, Bioswale and Naturalized Drainage Way

Construction sequencing for the installation of **Bioretention**, **Bioswale** and **Naturalized Drainage Way** facilities has many common steps that have been consolidated into a master table (**Table 4**). Items in the master table that are not applicable to one of the three facilities will be highlighted and noted as such.

The construction sequence and steps specific to each type of facility have been summarized in **Figure 1**.

Figure 1. Construction Tasks for Bioretention, Bioswale and Naturalized Drainage Way Facilities



Table 4. Construction Sequencing for Bioretention, Bioswale and Naturalized Drainage Way Facilities




Item	Construction Task	How to Implement	Photo	Purpose	Inspection Items	Inspection Timing	Inspection Responsibility	Potential Corrective Actions
1	Clearing and Grubbing	<ul style="list-style-type: none"> Only remove vegetation necessary for construction of facility. 	 <p>Area stabilized with grass. Only facility exposed.</p>	<ul style="list-style-type: none"> Vegetation cover stabilizes the drainage area and reduces the chance of sedimentation and erosion. 	<ul style="list-style-type: none"> Confirm that vegetation marked for removal is within the facility footprint area and/or site access route. If vegetation to be removed is on City property ensure that vegetation has been evaluated as per the <i>Corporate Tree Management Policy</i>. 	<ul style="list-style-type: none"> Inspect when facility and avoidance zones have been marked and when clearing and grubbing begins. 	Owner's Representative (engineering or landscape inspector).	<ul style="list-style-type: none"> Reinstate clearing and grubbing limits, instruct Contractor to re-stabilize any areas that have been unnecessarily disturbed.
2	Pre-treatment	<ul style="list-style-type: none"> Install pre-treatment facilities. Seal-off pre-treatment facilities and protect from stormwater flow until construction is completed. 	 <p>Riprap pre-treatment installed.</p>	<ul style="list-style-type: none"> Pre-treatment facility must be protected from contamination throughout the construction process and may not be used as a sediment trap. 	<ul style="list-style-type: none"> Pre-treatment is installed as per engineering plans and is protected (unless otherwise stated). 	<ul style="list-style-type: none"> Inspect once installed. 	Owner's Representative (engineering inspector). Note: If vegetated pre-treatment is specified, a landscape representative should be involved.	<ul style="list-style-type: none"> If no pre-treatment specified, review with design team for assurance or approval.
3	Excavation	<ul style="list-style-type: none"> Do not excavate when soils are wet or saturated. Excavate from outside of the facility limits. If operating within facility use lightweight, wide track equipment. 	 <p>See Item 1 photo. Light, wide-track equipment.</p>	<ul style="list-style-type: none"> Operating heavy equipment outside of the facility footprint avoids compaction of the bottom of the facility and potential sedimentation. 	<ul style="list-style-type: none"> Equipment operating outside facility. Equipment within the facility has been approved by inspector. Tree roots are cut flush with side walls by arborist. 	<ul style="list-style-type: none"> Inspect when excavation commences and periodically during construction. 	Owner's Representative (engineering inspector). Note: Survey verification of grades is required.	<ul style="list-style-type: none"> A compacted facility bottom will require scarification to a depth of 300 mm. A silt contaminated facility bottom may require over-excavation, consult design team.

Table 4. Construction Sequencing for Bioretention, Bioswale and Naturalized Drainage Way Facilities




Item	Construction Task	How to Implement	Photo	Purpose	Inspection Items	Inspection Timing	Inspection Responsibility	Potential Corrective Actions
4	Scarification <i>(if specified)</i>	<ul style="list-style-type: none"> Use a toothed bucket or ripper tool to scarify soils as per design. Scarify to a depth of 300mm if facility bottom has been compacted. 	 <p>Working outside facility with toothed bucket.</p>	<ul style="list-style-type: none"> Scarification is used to improve the infiltration capacity of the bottom of the facility and to amend compacted soils. 	<ul style="list-style-type: none"> Confirm scarification depth matches design <p>OR</p> <ul style="list-style-type: none"> Confirm that compacted bottoms have been scarified. 	<ul style="list-style-type: none"> Inspect when completed. 	Owner's Representative (engineering inspector).	<ul style="list-style-type: none"> If no scarification is shown on plans confirm it is not needed with design team prior to proceeding.
5	Rough Grade	<ul style="list-style-type: none"> Ensure rough grade matches design and facility bottom is smoothly graded. 	 <p>Rough grade matches design, site stable with sod.</p>	<ul style="list-style-type: none"> Bottom of facility must be smoothly graded to ensure even infiltration and prevent premature clogging, settlement or ponding. 	<ul style="list-style-type: none"> Rough grade matches design. 	<ul style="list-style-type: none"> Inspect when completed. 	Owner's Representative (engineering inspector). Note: Survey verification of grades is required.	<ul style="list-style-type: none"> If facility bottom is not smoothly graded, confirm that this is the design intent. Instruct contractor to match grades as appropriate.
6	Geotextile <i>(if specified)</i>	<ul style="list-style-type: none"> Ensure filter fabric is sufficiently sized to provide 150 mm overlap where ends meet. Oversized filter fabric may act as emergency ESC for rock trenches if required. 	 <p>Geotextile on trench walls. Excess can protect rock during rain event.</p>	<ul style="list-style-type: none"> Geotextile keeps trench walls moist and prevents material from sluffing off and contaminating drainage layers. Excess fabric may be wrapped around rock trenches to provide emergency ESC during rain events. 	<ul style="list-style-type: none"> Geotextile is clean and appropriately sized to meet design needs. Geotextile has been installed as per design. Ends have been overlapped by 150 mm. 	<ul style="list-style-type: none"> Confirm material meets specifications once it arrives on site. Inspect installation of fabric when installation commences and once completed. 	Owner's Representative (engineering inspector).	<ul style="list-style-type: none"> Instruct to install as per design. Instruct to overlap ends by 150mm.

Table 4. Construction Sequencing for Bioretention, Bioswale and Naturalized Drainage Way Facilities




Item	Construction Task	How to Implement	Photo	Purpose	Inspection Items	Inspection Timing	Inspection Responsibility	Potential Corrective Actions
7	Underdrain <i>(if specified)</i>	<ul style="list-style-type: none"> Install to grade and place clean-out/inspection chambers as per design. Mark locations of cleanouts (if specified). 	 <p>Perforations match design, cleanout facing downstream.</p>	<ul style="list-style-type: none"> Underdrains provide additional de-watering. They are often laid on very flat grades, so precision is key to ensure no standing water in the pipe. Facilities with existing infiltration rates <13mm/hr require underdrain. 	<ul style="list-style-type: none"> Vertical placement matches design detail. Direction of perforations matches design detail. Size and material of pipe matches specifications. Placement and orientation of cleanouts are correct. Cleanouts have been marked and signage is in place. Grade of pipe matches design and pipe is free of sags. 	<ul style="list-style-type: none"> Confirm material and size once it arrives on site. Inspect once installation commences and following completion of works. 	Owner's Representative (engineering inspector).	<ul style="list-style-type: none"> Direct contractor to correct pipe orientation, material or size if necessary. Have pipe re-laid if grade does not match design. If cleanouts are not marked, confirm with design team.
8	Overflow Drain <i>(if specified)</i>	<ul style="list-style-type: none"> Install to grade at specified location. 	 <p>Clean overflow, with no obstructions, to grade.</p>	<ul style="list-style-type: none"> Diverts excess flow during heavy rain events and during spring melt (especially if facility is next to a road or parking lot). 	<ul style="list-style-type: none"> Size and material of drain matches specification. Placement and orientation is correct. Rim elevation matches design. 	<ul style="list-style-type: none"> Confirm material and gradation once it arrives on site. Inspect once installation commences. 	Owner's Representative (engineering inspector).	<ul style="list-style-type: none"> Direct contractor to reinstall if it does not meet material specified on design drawings. Have contractor reinstall if drain is not sitting at the appropriate grade.
9	Reservoir Course	<ul style="list-style-type: none"> Place granular material as per design, working from outside of facility. Ensure granular material is washed and free of fines or debris. 	 <p>Working outside facility placing gravel drainage layer.</p>	<ul style="list-style-type: none"> If the rock is not washed, fines can clog facility soils and/or the underdrain. Angular rock can damage the underdrain. Working outside the facility prevents sub-grade compaction and underdrain damage. 	<ul style="list-style-type: none"> Rock gradation is as per design. Rock is rounded and washed. Depth of placement matches design. 	<ul style="list-style-type: none"> Confirm material and gradation once it arrives on site. Inspect once installation commences and following completion of works. 	Owner's Representative (engineering inspector).	<ul style="list-style-type: none"> Do not approve installation of any non-washed and non-approved rock. Instruct contractor to work from outside facility, unless previously approved.

Table 4. Construction Sequencing for Bioretention, Bioswale and Naturalized Drainage Way Facilities



Item	Construction Task	How to Implement	Photo	Purpose	Inspection Items	Inspection Timing	Inspection Responsibility	Potential Corrective Actions
10	Graded Filter Layer <i>(if specified)</i>	<ul style="list-style-type: none"> Place as per design, working from outside of facility. Ensure granular material is washed and free of fines or debris. 	 <p>Working outside facility placing filter drainage layer.</p>	<ul style="list-style-type: none"> Serves as a filter layer between the reservoir course and the amended soil media. Typically used in place of geotextile. 	<ul style="list-style-type: none"> Rock gradation is as per design. Rock is washed. Depth of placement matches design. 	<ul style="list-style-type: none"> Confirm material and gradation once it arrives on site. Inspect once installation commences and following completion of works. 	Owner's Representative (engineering inspector).	<ul style="list-style-type: none"> Do not approve installation of any non-washed and non-approved rock. Instruct contractor to work from outside facility, unless previously approved.
11	Curbing <i>(if specified)</i>	<ul style="list-style-type: none"> Ensure fencing or concrete curbs are installed as per design. 	 <p>Concrete curbing protecting facility within parking lot.</p>	<ul style="list-style-type: none"> Extra protection for facilities that are in high traffic areas (pedestrian and vehicular). 	<ul style="list-style-type: none"> Barriers match design. Sitting at appropriate grade. 	<ul style="list-style-type: none"> Confirm material meets specifications once it arrives on site. Inspect once installed. 	Owner's Representative (engineering or landscape inspector). OPTIONAL: City Inspector from Transportation (for concrete work).	<ul style="list-style-type: none"> If material does not meet specification it should be removed and installed with appropriate material.
12	Amended Soil Media	<ul style="list-style-type: none"> Submit approved soil media tests prior to delivering soil to site. Place soil in 150 mm lifts and hydraulically compact (via sprinkling water) or boot-compacted between lifts. Place soil from outside facility. Rough grade with machinery and fine grade by hand. 	 <p>Soil before compaction and fine grading by hand. Placed from outside of facility.</p>	<ul style="list-style-type: none"> Soil amendments typically provide increased organic and sand content, and reduced fines. These improve infiltration and support plant growth. Soils not meeting specifications can become clogged or clog underdrains, and cause facility failure. 	<ul style="list-style-type: none"> Amended soil media is being stored away from the facility and other potential contaminants. Soil tests (full spectrum) have been reviewed and approved. Lifts are placed in 150mm increments and compacted hydraulically or by boot compaction. Work is performed from outside the facility. Finish grades match design. 	<ul style="list-style-type: none"> Review soil media tests as soon as they are available. Review stockpile location(s) with site superintendent prior to material delivery. Inspect installation once it commences and following completion of works. 	Owner's Representative (engineering or landscape inspector).	<ul style="list-style-type: none"> Ask for additional testing if initial tests do not pass. Ask for multiple tests for large material batches.

Table 4. Construction Sequencing for Bioretention, Bioswale and Naturalized Drainage Way Facilities

Item	Construction Task	How to Implement	Photo	Purpose	Inspection Items	Inspection Timing	Inspection Responsibility	Potential Corrective Actions
13	Grade Control Structures <i>(if specified)</i>	<ul style="list-style-type: none"> Ensure grass berms, drop structures and check dams are installed to appropriate grade. 	 <p>Concrete grade control structure.</p>	<ul style="list-style-type: none"> Helps to control the flow of water. 	<ul style="list-style-type: none"> Height, width and material are as per design. 	<ul style="list-style-type: none"> Once grade control structures have been installed. 	Owner's Representative (engineering inspector).	<ul style="list-style-type: none"> Correct height, width or material to meet specification.
14	Finish Grading	<ul style="list-style-type: none"> Finish grade the amended soil media by hand using rakes. 	 <p>Finish grading has been completed by hand.</p>	<ul style="list-style-type: none"> Bioretention facilities often have very fine grading that needs to be completed by hand. Hand grading also avoids excess compaction by machinery. 	<ul style="list-style-type: none"> Finish grade matches design and is ready for matting and plant material. Important points to confirm include the inlet, outlet, overflow and ponding depths and that the pointing area is level. 	<ul style="list-style-type: none"> Inspect once complete. 	Owner's Representative (engineering or landscape inspector).	<ul style="list-style-type: none"> Direct contractor to re-grade any areas not matching design.
15	Erosion Control Matting <i>(if specified)</i>	<ul style="list-style-type: none"> Place as per manufacturer's installation guidelines and as per design once fine grading is complete. 	 <p>Erosion control matting placed after finish grading.</p>	<ul style="list-style-type: none"> Erosion matting will prevent erosion of exposed soils prior to plants taking root. 	<ul style="list-style-type: none"> Product matches specifications. Product is placed in the correct location. 	<ul style="list-style-type: none"> Inspect material once it arrives on site and again once installed. 	Owner's Representative (landscape inspector).	<ul style="list-style-type: none"> Direct contractor to re-install any material not conforming to specification and manufacturers installation instructions.

Table 4. Construction Sequencing for Bioretention, Bioswale and Naturalized Drainage Way Facilities




Item	Construction Task	How to Implement	Photo	Purpose	Inspection Items	Inspection Timing	Inspection Responsibility	Potential Corrective Actions
16	Riprap (if specified)	<ul style="list-style-type: none"> Install as per plan ensuring specified rock gradation and depth. Use riprap to achieve finished grade. 	 <p>Specified size and placement achieving finished grade of facility.</p>	<ul style="list-style-type: none"> Prevents soil erosion and helps with slope stabilization. 	<ul style="list-style-type: none"> Riprap matches specifications. Riprap has been installed evenly. Riprap has achieved finish grade and does not degrade design (such as blocking inlet). 	<ul style="list-style-type: none"> Inspect material once it arrives on site. Inspect once completed. 	Owner's Representative (engineering inspector).	<ul style="list-style-type: none"> Request new material. Re-install riprap.
17	Plant Material Verification	<ul style="list-style-type: none"> Install as per design. Any plant material substitutions must be approved prior to installation. 	 <p>Plant material matches species specified in landscape plans.</p>	<ul style="list-style-type: none"> Plant substitutions can lead to poor plant health, poor facility aesthetics and reduced facility function. 	<ul style="list-style-type: none"> Plant material has been approved prior to delivery. Plant material has been confirmed upon delivery. Plant material approved as specified and in healthy condition. 	<ul style="list-style-type: none"> Inspect upon arrival to site. 	Owner's Representative (landscape inspector). OPTIONAL: City inspector from Parks.	<ul style="list-style-type: none"> If plant species are in poor condition then other nursery providers should be contacted. <p>OR</p> <ul style="list-style-type: none"> Look at species substitution that are appropriate for the facility.
18	Plant Material Installation	<ul style="list-style-type: none"> Dig holes on the scheduled plant delivery day. Plant material (trees/shrubs) to be installed the same day as delivery and watered immediately after installation. Herbaceous plugs to be stored properly and planted with soil auger, small spade, or hand trowel. 	 <p>Holes being dug on the plant delivery day.</p>	<ul style="list-style-type: none"> Plant material should be planted as soon as it is brought to site to avoid stressing the plant material. Water helps remove air pockets around plant roots and assists in alleviating any stress the plant material may be under. 	<ul style="list-style-type: none"> Holes are ready on delivery day. Plant material has been installed as per City standard on the day of delivery. Plant material has been watered. Tree straps and stakes to be installed and removed according to schedule. 	<ul style="list-style-type: none"> Inspect once completed. 	Owner's Representative (landscape inspector). OPTIONAL: City inspector from Parks.	<ul style="list-style-type: none"> If plant holes are not ready on scheduled arrival day, then plants should be held at nursery until site is ready. If plants are not installed correctly have contractor re-install plant material as per City standards.

Table 4. Construction Sequencing for Bioretention, Bioswale and Naturalized Drainage Way Facilities

Item	Construction Task	How to Implement	Photo	Purpose	Inspection Items	Inspection Timing	Inspection Responsibility	Potential Corrective Actions
19	Mulch <i>(if specified)</i>	<ul style="list-style-type: none"> Install mulch as per design and to specified depth. 	 <p>Mulch placed as per plans and achieves finish grade.</p>	<ul style="list-style-type: none"> Even application prevents weeds and soil erosion. Mulch often acts as the final grade of the facility, ensure depth is as per design to prevent blocking inlets and reducing or increasing ponding capacity. 	<ul style="list-style-type: none"> Mulch material meets City standards. Mulch has been installed evenly. If netting is specified (to prevent movement down slope), it is installed correctly. No settlement has occurred. Mulch is applied to the correct depth. Mulch has achieved finish grade and does not degrade design (such as blocking inlet). 	<ul style="list-style-type: none"> Inspect material once it arrives on site and again once installed. 	Owner's Representative (landscape inspector).	<ul style="list-style-type: none"> Evenly distribute mulch. Remove/add to reach finish grade.
20	Adjacent Vegetation	<ul style="list-style-type: none"> Install remaining plant material and seed bordering facility as early as possible to help prevent facility contamination. Water immediately after installation. 	 <p>Sod adjacent to facility has been placed.</p>	<ul style="list-style-type: none"> Finish the remainder of site landscaping (e.g. sod) as early as possible (before or after LID facility is complete) to prevent erosion, damage and/or contamination of LID components. 	<ul style="list-style-type: none"> Plant material has been installed as per City standard. Turf areas have been installed evenly and as per City standard. Material has been watered. 	<ul style="list-style-type: none"> Once completed. 	Owner's Representative (landscape inspector). OPTIONAL: City inspector from Parks.	<ul style="list-style-type: none"> If vegetation is not installed correctly have contractor re-install as per City standard.
21	Fencing	<ul style="list-style-type: none"> Install fencing around perimeter of facility. 	 <p>Fencing around facility.</p>	<ul style="list-style-type: none"> Delineates the facility while providing a safety barrier to pedestrians. 	<ul style="list-style-type: none"> Fence material is as per design. Fence has been installed in the correct location. 	<ul style="list-style-type: none"> Once completed. 	Owner's Representative (landscape inspector).	<ul style="list-style-type: none"> Re-order correct fence material. Re-install fence correctly as per design and perform any necessary repairs as a result of reinstallation.

4.4.1.2 Box Planter

Box Planters are sub-divided into four different variations:

- Contained Planter
- Flow-through Planter
- Infiltration Planter
- Soil Cell Planter

The construction sequence and steps specific to each type of box planter have been consolidated into a master table (**Table 5**). Items in the master table that are not applicable to one of the four sub-types will be highlighted and noted as such.

The construction sequence and steps specific to each type of box planter have been summarized in **Figure 2**.

Figure 2. Construction Tasks by Box Planter Type



Table 5. Construction Sequencing for Box Planters

Item	Construction Task	How to Implement	Purpose	Inspection Items	Inspection Timing	Inspection Responsibility	Potential Corrective Actions
1	Site Preparation	<ul style="list-style-type: none"> • Clearing and Grubbing - only remove vegetation necessary for construction of facility. <p>OR</p> <ul style="list-style-type: none"> • Pavement removal and utility re-location (<i>applicable to urban retrofits</i>) – carefully remove pavement as per disturbance limits and coordinate utility re-location, if applicable. 	<ul style="list-style-type: none"> • Vegetation cover stabilizes the drainage area and reduces the chance of sedimentation. • Retrofit scenarios often require removal and relocation of existing infrastructure, including pavement, aggregates, and underground utilities. 	<ul style="list-style-type: none"> • Check that vegetation marked for removal is specific to the facility footprint and/or allows site access. • If vegetation to be removed is on City property, ensure that vegetation has been evaluated as per the <i>Corporate Tree Management Policy</i>. 	<ul style="list-style-type: none"> • Inspect when facility and avoidance zones are marked and once clearing and grubbing begins. 	Owner’s Representative (engineering inspector).	<ul style="list-style-type: none"> • Restate clearing and grubbing limits, instruct to re-stabilize any areas that have been unnecessarily cleared.
2	Excavation	<ul style="list-style-type: none"> • Do not excavate when soils are wet or saturated. • Excavate from outside of the facility limits. • If operating within facility, use lightweight, wide track equipment. • Immediately cut exposed tree roots flush with facility wall. • Ensure excavation elevations match design. 	<ul style="list-style-type: none"> • Operating outside of the facility footprint avoids facility bottom compaction and potential sedimentation. • Ensuring tree roots have a clean cut, instead of a ripped end, allows the roots to heal quickly which prevents disease. • Accurate excavation ensures a level facility and sets the stage for successful design implementation. 	<ul style="list-style-type: none"> • Equipment operating outside facility. • Equipment within the facility has been approved by inspector. • Tree roots are cut flush with side walls. • Facility grades have been confirmed and match design. 	<ul style="list-style-type: none"> • Inspect when excavation commences, when appropriate throughout and once completed. 	Owner’s Representative (engineering inspector). Note: Survey verification of grades is required.	<ul style="list-style-type: none"> • A silt contaminated facility bottom may require over-excavation, consult design team. • Compact excavated bottom to meet design.
3	Subgrade Preparation	<ul style="list-style-type: none"> • Scarification (<i>applicable to infiltration planter boxes</i>) - scarify to a depth of 300mm using a toothed bucket or ripper tool. <p>OR</p> <ul style="list-style-type: none"> • Compaction (applicable to contained, flow through and soil cell planters) - Compact bottom of planter to specification. 	<ul style="list-style-type: none"> • Scarification promotes infiltration through the bottom of the planter facility. <p>OR</p> <ul style="list-style-type: none"> • Compaction ensures that the sub-grade will not settle in the future, which can lead to cracks in concrete and pavement and potential failure of a plastic soil cell matrix. 	<ul style="list-style-type: none"> • Scarification depth. <p>OR</p> <ul style="list-style-type: none"> • Compaction density. 	<ul style="list-style-type: none"> • Inspect and/or test when completed. 	Owner’s Representative (engineering inspector). Note: geotechnical verification of compaction is required.	<ul style="list-style-type: none"> • Instruct to scarify to the correct depth, recommend a toothed bucket or ripper tool. <p>OR</p> <ul style="list-style-type: none"> • Instruct to re-compact until compaction test passes.

Table 5. Construction Sequencing for Box Planters

Item	Construction Task	How to Implement	Purpose	Inspection Items	Inspection Timing	Inspection Responsibility	Potential Corrective Actions
4	Geotextile <i>(if specified)</i>	<ul style="list-style-type: none"> Ensure filter fabric is sufficiently sized to provide 150mm overlap where ends meet. 	<ul style="list-style-type: none"> Geotextile keeps trench walls moist and prevents material from sluffing off, material sluffing could contaminate facility bottom. 	<ul style="list-style-type: none"> Geotextile is clean and appropriately sized to meet design needs. Geotextile has been installed as per design. Ends have been overlapped by 150mm. 	<ul style="list-style-type: none"> Confirm material meets specifications once it arrives on site. Inspect installation of fabric when installation commences and once completed. 	Owner's Representative (engineering inspector).	<ul style="list-style-type: none"> Replace with material that meets specifications or an approved alternative. Instruct to overlap ends by 150mm.
5	Sub-base aggregate	<ul style="list-style-type: none"> Place aggregate to design depth and compact as per specified. Place material from outside of the facility. <i>For soil cell facilities</i> - mark location of boxes for plant material. 	<ul style="list-style-type: none"> Proper material, design depth and compaction provides a stable foundation. Working outside the facility prevents unintended compaction. <i>For soil cell facilities</i> – boxes for plant material must be marked prior to installation of plastic matrix to ensure they are in the design location. 	<ul style="list-style-type: none"> Aggregate gradation meets specification. Depth of placement matches design. Compaction has been tested and meets specification. <i>For soil cell facilities</i> – plant material boxes have been marked properly. 	<ul style="list-style-type: none"> Confirm material meets specification once it arrives on site. Inspect during installation. <i>For soil cell facilities</i> – after compaction is complete, prior to installation of plastic matrix. 	Owner's Representative (engineering or landscape inspector). Note: geotechnical verification of compaction is required.	<ul style="list-style-type: none"> Instruct to adjust depth to meet design. Instruct to re-compact until compaction test passes. <i>For soil cell facilities</i> – instruct to mark if markings are missing OR instruct to re-mark if marking are incorrect.
6	Underdrain <i>(applicable to contained, flow through and soil cell planters)</i>	<ul style="list-style-type: none"> Install pipe as per design. Contained planters typically have a vertically placed non-perforated overflow outlet pipe. Flow through and soil cell planters typically have a perforated pipe laid on the bottom of the planter. 	<ul style="list-style-type: none"> Provides an emergency outlet (via overflow spill or bottom pipe collection) to prevent the facility from being flooded during storm events greater than the design storm event. 	<ul style="list-style-type: none"> Size, material and type of pipe matches specifications. Grade of pipe matches design and pipe is free of sags. Pipe installation matches design location and orientation. If connecting to downstream City infrastructure, the tie-in location matches design and tie-in method meets City specifications. 	<ul style="list-style-type: none"> Confirm material, size and type of pipe once it arrives on site. Confirm grade once pipe is laid. Confirm method of connection to City infrastructure prior to work being performed, inspect once work is completed. 	Owner's Representative (engineering inspector).	<ul style="list-style-type: none"> Direct contractor to correct pipe orientation, material, type or size if necessary. Have pipe re-laid if grade does not match design. Direct to use a City approved catchbasin or manhole connection technique.

Table 5. Construction Sequencing for Box Planters

Item	Construction Task	How to Implement	Purpose	Inspection Items	Inspection Timing	Inspection Responsibility	Potential Corrective Actions
7	Overflow Drain <i>(if specified)</i>	<ul style="list-style-type: none"> Install to grade at specified location. Install correct grate or catchbasin top. 	<ul style="list-style-type: none"> Diverts excess flow during heavy rain events and during spring melt (especially if facility is next to a road or parking lot). 	<ul style="list-style-type: none"> Size and material of drain matches specification. Placement and orientation is correct. Rim elevation matches design. 	<ul style="list-style-type: none"> Confirm material and gradation once it arrives on site Inspect once installation commences. 	Owner's Representative (engineering inspector)	<ul style="list-style-type: none"> Direct contractor to reinstall if it does not meet material specified on design drawings. Have contractor reinstall if drain is not sitting at the appropriate grade
8-1	Concrete Box <i>(applicable to contained, flow through and infiltration planters)</i>	<ul style="list-style-type: none"> Install concrete as per design. Contained and flow through planters typically require a concrete box. Infiltration planters typically require walls without a concrete bottom. 	<ul style="list-style-type: none"> To contain and delineate the facility. 	<ul style="list-style-type: none"> Ensure concrete is tested and passes. Concrete box dimensions and location match design. 	<ul style="list-style-type: none"> Inspect concrete forms once complete. Inspect installation of concrete. Inspect once forms removed. 	Owner's Representative (engineering inspector). Note: quality assurance testing is required.	<ul style="list-style-type: none"> Instruct to adjust forms if incorrect. Instruct to re-install if concrete does not pass quality assurance testing.
8-2	Soil Cells <i>(applicable to soil cell planters)</i>	<ul style="list-style-type: none"> Install soil cells as per design and manufacturer's specifications. Ensure soil cells are spaced appropriately, typically leaving a gap between facility side walls. Ensure tree openings are installed in the design location. 	<ul style="list-style-type: none"> Leaving a gap between the soil cells and facility side walls will allow for working room when installing the cells. Incorrect spacing can affect stability of plastic matrix and lead to difficulty when installing decking. Incorrect placement of openings in the plastic matrix will alter inlet locations, catchment sizes and can negatively impact the water quality improvement capacity of the facility. 	<ul style="list-style-type: none"> Plastic matrix installation and spacing meets design and manufacturer specifications. Tree openings are installed in the design location. 	<ul style="list-style-type: none"> Inspect plastic matrix when material arrives to site. Inspect installation of soil cells to ensure they are properly spaced. Inspect soil cells once they are installed. 	Owner's Representative (engineering or landscape inspector). Optional additional inspection: Manufacturer's Representative.	<ul style="list-style-type: none"> Order proper plastic matrix material to match design. Re-install plastic matrix as per design and manufacturer's specifications.
9	Impermeable Barrier <i>(applicable at this point in construction sequence to contained, flow through and infiltration planters)</i>	<ul style="list-style-type: none"> Layer interior of concrete box with impermeable barrier. 	<ul style="list-style-type: none"> Impermeable barrier ensures tree roots do not migrate into concrete surface (e.g. foundations, walkways, roadways) causing cracks, heaving and buckling. 	<ul style="list-style-type: none"> Confirm material meets specifications and is at appropriate length once it arrives to site. 	<ul style="list-style-type: none"> Inspect once installed. 	Owner's Representative (landscape inspector).	<ul style="list-style-type: none"> Instruct to install as per design.

Table 5. Construction Sequencing for Box Planters

Item	Construction Task	How to Implement	Purpose	Inspection Items	Inspection Timing	Inspection Responsibility	Potential Corrective Actions
10	Reservoir Course	<ul style="list-style-type: none"> Place specified gradation of washed rounded aggregate, working from outside of facility. 	<ul style="list-style-type: none"> This layer acts as a reservoir, ensuring that above soils drain adequately. If the rock is not washed, fines can clog underlying soils and/or the underdrain. Angular rock can damage the underdrain. Working outside the facility prevents compaction and underdrain damage. 	<ul style="list-style-type: none"> Rock gradation is as per specification. Rock is rounded and washed. Depth of placement matches design. 	<ul style="list-style-type: none"> Confirm material and gradation once it arrives on site. Inspect once installation commences and following completion of work. 	Owner's Representative (engineering inspector).	<ul style="list-style-type: none"> Do not approve installation of any non-washed rock not meeting specification. Instruct contractor to work from outside facility, unless previously approved.
11	Geogrid <i>(applicable to soil cell planters)</i>	<ul style="list-style-type: none"> Wrap around the perimeter of the soil cells, allowing appropriate excess material at the top and bottom as per manufacturer's specifications. Anchor with one lift of un-compacted perimeter backfill material. 	<ul style="list-style-type: none"> Provides a separation between the compacted perimeter backfill and the un-compacted soil in the soil cells. 	<ul style="list-style-type: none"> Geogrid material matches specification. Geogrid dimensions allow for sufficient overhang at the top and bottom of the cells. Geogrid has been properly secured at the top and bottom of the cells. 	<ul style="list-style-type: none"> Once the material arrives on site. After material has been installed around cells. 	Owner's Representative (engineering inspector).	<ul style="list-style-type: none"> Request that the specified material, or an approved equivalent, be used. Request that the material be cut to the appropriate dimensions to allow for overhang.
12	Amended Soil Media	<ul style="list-style-type: none"> Submit approved soil media tests prior to delivering soil to site. Working from outside facility, place soil in 150 mm lifts, preferably with a loader or slinger truck. Compact hydraulically (via sprinkling water) or by boot-compaction (by walking on material) between lifts. Rough grade with machinery and fine grade by hand. 	<ul style="list-style-type: none"> Soil amendments typically provide increased organic and sand content, and reduced fines. These improve infiltration and support plant growth. Soil not meeting specifications poorly infiltrates water and can clog underdrains. This leads to increased maintenance efforts and can cause facility failure. 	<ul style="list-style-type: none"> Amended soil media is being stored away from the facility and other potential contaminants. Soil tests (full spectrum) have been reviewed and approved. Lifts are placed in 150mm increments and compacted hydraulically or by boot compaction. Work is being performed from outside the facility. 	<ul style="list-style-type: none"> Review soil media tests when available. Multiple tests required for large soil batches. Review stockpile location with site superintendent prior to material delivery. Inspect stockpile periodically to ensure no new contaminants have been introduced. Inspect installation and compaction of soil media. 	<p>Owner's Representative (engineering or landscape inspector).</p> <p>*Both the engineering and landscaping inspectors are to review soil media tests.</p>	<ul style="list-style-type: none"> If initial soil tests do not pass, soil will need to be amended and tested until soil meets specification. If stockpile contamination is suspected, test on-site material. If material is over compacted, scarify to an appropriate depth, based on depth of material already placed.

Table 5. Construction Sequencing for Box Planters

Item	Construction Task	How to Implement	Purpose	Inspection Items	Inspection Timing	Inspection Responsibility	Potential Corrective Actions
13	Perimeter Backfill	<ul style="list-style-type: none"> Place approved backfill material and compact in lifts of 150mm. 	<ul style="list-style-type: none"> Backfill material supports above pavement or sidewalks. 	<ul style="list-style-type: none"> Backfill is being placed in 150mm lifts. Backfill compaction passes testing. 	<ul style="list-style-type: none"> When material arrives on site. As material is being installed. 	<p>Owner's Representative (engineering inspector).</p> <p>Note: geotechnical verification of compaction is required.</p>	<ul style="list-style-type: none"> Replace with material that meets specifications or an approved alternative. Re-compact until compaction passes testing.
14	Cell Decks <i>(applicable to soil cell planters)</i>	<ul style="list-style-type: none"> Install as per manufacturer's specifications, snapping down on frame, securing and folding over geogrid. 	<ul style="list-style-type: none"> Decks cap off the frame and prevent movement, while providing a rigid platform for aggregates and pavement to be placed on top. 	<ul style="list-style-type: none"> Decks are being installed and secured as per manufacturer's recommended sequencing and timing, no frame movement is taking place. 	<ul style="list-style-type: none"> As decks are being installed. 	<p>Owner's Representative (engineering or landscape inspector).</p> <p>Optional additional inspection: Manufacturer's Representative.</p>	<ul style="list-style-type: none"> Contact Manufacturer's Representative if improper installation is observed.
15	Geotextile <i>(applicable at this point in construction sequence to soil cell planters)</i>	<ul style="list-style-type: none"> Ensure fabric is sufficiently sized to provide 300mm overlap where ends meet and to cover the entire excavated area (cell area and perimeter backfill area). Ensure to cut tree openings. 	<ul style="list-style-type: none"> Geotextile prevents aggregate from entering the cell matrix through openings in the decks. 	<ul style="list-style-type: none"> Geotextile is clean and appropriately sized to cover the entire excavated area. Ends have been overlapped by 300mm if necessary. 	<ul style="list-style-type: none"> Confirm material meets specifications once it arrives on site. Inspect installation of fabric when installation commences and once completed. 	<p>Owner's Representative (engineering inspector).</p>	<ul style="list-style-type: none"> Replace with material that meets specifications or an approved alternative. Instruct to cover entire excavated area. Instruct to overlap ends by 300mm.
16	Base Course Aggregate	<ul style="list-style-type: none"> Install aggregate meeting specification, working from one end to the other. Place in 150mm lifts or as per design. Compact as needed to achieve required density. Contained, flow through and infiltration planters – aggregate will be placed adjacent to the box. Soil cell planters – aggregate will be placed on geotextile. 	<ul style="list-style-type: none"> Base course aggregate supports pavement or sidewalk structure. Contained, flow through and infiltration planters – placed adjacent to box as pavement or sidewalk will surround the planter. Soil cell planters – placed on top of the geotextile as pavement or sidewalk is constructed above cell matrix. 	<ul style="list-style-type: none"> Aggregate meets specification. Aggregate is being placed in appropriate lifts. Compaction has been tested and meets required density. 	<ul style="list-style-type: none"> When material arrives on site. As material is being installed. When compaction is being tested. 	<p>Owner's Representative (engineering inspector).</p> <p>Note: geotechnical verification of compaction is required.</p>	<ul style="list-style-type: none"> Replace with material that meets specifications. Instruct to place in appropriate lifts. Instruct to re-compact until compaction test is passed.

Table 5. Construction Sequencing for Box Planters

Item	Construction Task	How to Implement	Purpose	Inspection Items	Inspection Timing	Inspection Responsibility	Potential Corrective Actions
17	Impermeable Barrier <i>(applicable at this point in construction sequence to soil cell planters)</i>	<ul style="list-style-type: none"> Place around tree opening. 	<ul style="list-style-type: none"> Impermeable barrier ensures tree roots do not migrate into concrete surface (e.g. foundations, walkways, roadways) causing cracks, heaving and buckling. 	<ul style="list-style-type: none"> Confirm material meets specifications and is at appropriate length once it arrives to site. 	<ul style="list-style-type: none"> Inspect once installed. 	Owner's Representative (landscape inspector).	<ul style="list-style-type: none"> Instruct to install as per design.
18	Pavement and Curbs	<ul style="list-style-type: none"> Install pavement and curbs as per design. 	<ul style="list-style-type: none"> Proper pavement or sidewalk slope directs flow as per design (either towards or away from planter). Proper curb installation ensures drainage is directed to facility (via curb cut) or prevented from entering facility, ensuring facility receives the design volume of runoff. 	<ul style="list-style-type: none"> Material testing as per City specifications. Pavement grade matches design. Curbs are installed using the proper shape form. Curb cut shape matches the engineering detail and the cut location matches design. 	<ul style="list-style-type: none"> As material is being installed. After installation is complete. 	Owner's Representative (engineering inspector).	<ul style="list-style-type: none"> Correct sidewalk or pavement slope. Instruct to use proper curb form. Instruct to install proper curb cut type and/or relocate the curb cut.
19	Plant Material Verification	<ul style="list-style-type: none"> Install as per approved landscape plans. Ensure plant material is salt tolerant when adjacent to roadways. Any plant material substitutions must be approved prior to installation. 	<ul style="list-style-type: none"> These facilities are often adjacent to roads and walkways, which are often salted during winter months. Therefore, plants within these areas can be exposed to salt. Plant substitutions can lead to poor plant health, poor facility aesthetics and reduced facility function. 	<ul style="list-style-type: none"> Plant material has been approved prior to delivery. Plant material has been confirmed upon delivery. Plant material approved as specified and in healthy condition. 	<ul style="list-style-type: none"> Once material arrives on site. 	Owner's Representative (landscape inspector). <i>OPTIONAL:</i> City representative from Urban Forestry (Community Services).	<ul style="list-style-type: none"> If plant species are in poor condition, then other nursery providers should be contacted. <p>OR</p> <ul style="list-style-type: none"> Look at species substitution that are appropriate for the facility.
20	Plant Material Installation	<ul style="list-style-type: none"> Dig holes on the scheduled plant delivery day. Plant material (trees/shrubs) to be installed the same day as delivery and watered immediately after installation. 	<ul style="list-style-type: none"> Plant material should be planted as soon as it is brought to site to avoid stress. Water helps remove air pockets around plant roots and alleviate any stress it may be under. 	<ul style="list-style-type: none"> Holes are ready on delivery day. Plant material has been installed as per City standard on the day of delivery. Plant material has been watered. Tree straps and stakes to be installed and removed according to schedule. 	<ul style="list-style-type: none"> Once material is installed. 	Owner's Representative (landscape inspector). <i>OPTIONAL:</i> City representative from Urban Forestry (Community Services).	<ul style="list-style-type: none"> If plant holes are not ready on scheduled arrival day, then plants should be held at nursery until site is ready. If plants are not installed correctly have contractor install plant material as per City standards.

Table 5. Construction Sequencing for Box Planters

Item	Construction Task	How to Implement	Purpose	Inspection Items	Inspection Timing	Inspection Responsibility	Potential Corrective Actions
21	Tree Grates <i>(if specified)</i>	<ul style="list-style-type: none"> Ensure trees have been planted to City standard prior to installing tree grate. Install tree grates over tree opening. 	<ul style="list-style-type: none"> Creates a flush surface with paved surface. Protects tree and soils from getting contaminated from debris. Adds to the aesthetics to the space. 	<ul style="list-style-type: none"> Ensure tree grate is as specified within design. Tree grate installed as per design. 	<ul style="list-style-type: none"> Confirm tree grate meets specification once it arrives on site. Inspect Installation of tree grate and inspect once completed. 	Owner's Representative (landscape inspector). OR Manufacture Representative.	<ul style="list-style-type: none"> Instruct to install as per design.
22	Erosion Control <i>(if specified)</i>	<ul style="list-style-type: none"> If specified, typically riprap armouring placed at inlet of facility. Install specified rock gradation as per design. 	<ul style="list-style-type: none"> Prevents erosion at inlet of facility. 	<ul style="list-style-type: none"> Rock gradation matches design. Rock is placed as per design. 	<ul style="list-style-type: none"> Once material arrives on site. Once material is installed. 	Owner's Representative (engineering or landscape inspector).	<ul style="list-style-type: none"> Instruct to supply specified material. Instruct to install as per design.
23	Mulch	<ul style="list-style-type: none"> Install surface cover shell as per plan and specified depth. Use mulch to achieve finished grade. 	<ul style="list-style-type: none"> Even application prevents weeds and soil erosion. Mulch often acts as the final grade of the facility, ensure depth is as per design to prevent blocking inlets and reducing or increasing ponding capacity. 	<ul style="list-style-type: none"> Mulch material meets City standards. Mulch has been installed evenly. No settlement has occurred. Mulch is applied to the correct depth. Mulch has achieved finish grade and does not degrade design (such as blocking inlet). 	<ul style="list-style-type: none"> Inspect material once it arrives on site. Inspect once completed. 	Owner's Representative (landscape inspector).	<ul style="list-style-type: none"> Evenly distribute mulch. Remove/add to reach finish grade.

4.4.2 Permeable Pavement

Permeable Pavement is sub-divided into four pavement types:

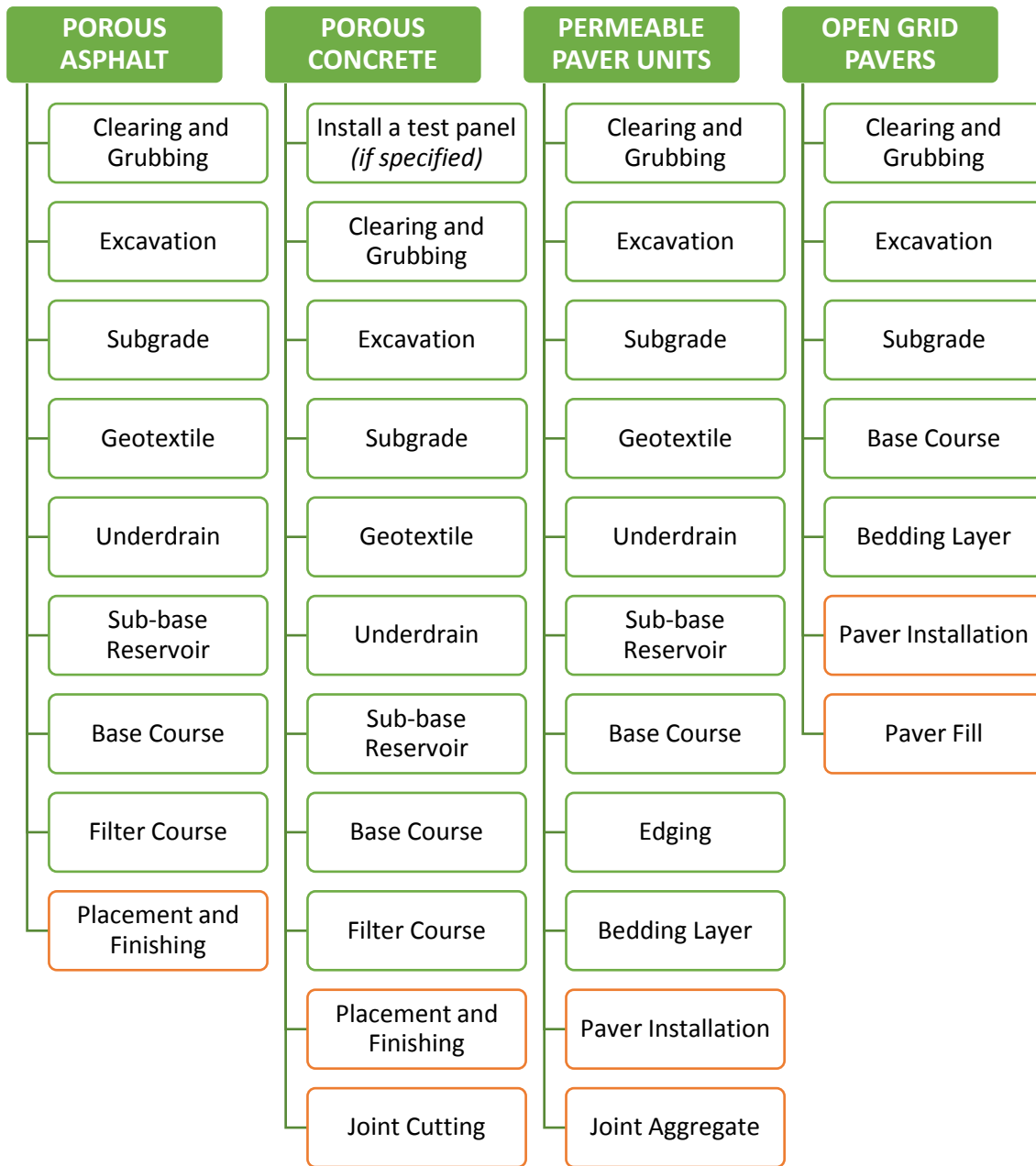
- Porous Asphalt
- Porous Concrete
- Permeable Paver Units
- Open Grid Pavers

One master installation table has been created for all types of permeable pavement, as shown in **Table 6**. The construction sequence and steps specific to each type of permeable pavement have been summarized in **Figure 3**. Installation techniques specific to each pavement type, to be used in addition to those presented in the table, are outlined in **Section 4.4.3.1** through **Section 4.4.3.4**.

Typical **pre-construction** steps as outlined in **Table 3** of **Section 3** are recommended prior to initiating construction of permeable pavements. For porous concrete, it is especially crucial to review driving paths during the pre-construction meeting. This will help avoid tight situations, prevent pavement damage or settling, and will allow concrete trucks to navigate the site in a timely manner.



Figure 3. Construction Tasks by Permeable Pavement Type



Colour Legend

Filter Course Described in Table 6

Placement and Finishing Described in Section 4.4.2.1. – 4.4.2.4

Table 6. Construction Sequencing for Permeable Pavement Facilities

Item	Construction Task	How to Implement	Photo	Purpose	Inspection Items	Inspection Timing	Inspection Responsibility	Potential Corrective Actions
1	Install a test panel <i>(applicable to porous concrete)</i>	<ul style="list-style-type: none"> Build a test panel (such as a single parking stall) in an approved location. 		<ul style="list-style-type: none"> To verify concrete quality, placement, joint creation and curing methods and equipment. 	<ul style="list-style-type: none"> Forms are installed properly. Equipment is appropriate for installation (e.g. screed is wide enough to be placed on forms). Drive routes onto site will not cause issues or delays (e.g. concrete truck can easily maneuver site while concrete is being placed). Placement technique is as per Section 4.4.2.2 or as approved by material supplier. 	<ul style="list-style-type: none"> Inspect forms and equipment prior to commencing installation. As test panel is being installed. 	<p>Owner's Representative (engineering inspector).</p> <p>Note: test panel shall be tested for target density and void content.</p>	<ul style="list-style-type: none"> Alter installation technique and/or equipment.
2	Clearing and Grubbing	<ul style="list-style-type: none"> Only remove vegetation necessary for construction of facility. 	 Area stabilized with grass. Only facility exposed.	<ul style="list-style-type: none"> Vegetation cover stabilizes the drainage area and reduces the chance of sedimentation. 	<ul style="list-style-type: none"> Check that vegetation marked for removal is specific to the facility footprint and/or allows site access. 	<ul style="list-style-type: none"> Inspect when facility and avoidance zones are marked and once clearing and grubbing begins. 	<p>Owner's Representative (engineering or landscape inspector).</p>	<ul style="list-style-type: none"> Restate clearing and grubbing limits, instruct to re-stabilize any areas that have been unnecessarily cleared.
3	Excavation	<ul style="list-style-type: none"> Do not excavate when soils are wet or saturated. Excavate from outside of the facility limits. If operating within facility, use lightweight, wide track equipment. 	 See Item 1 photo. Light, wide-track equipment.	<ul style="list-style-type: none"> Operating outside of the facility footprint avoids facility bottom compaction and potential sedimentation. 	<ul style="list-style-type: none"> Equipment operating outside facility. Equipment within the facility has been approved by inspector. Tree roots are cut flush with side walls. <p>Note: Survey verification of grades is required.</p>	<ul style="list-style-type: none"> Inspect when excavation commences and once completed. 	<p>Owner's Representative (engineering inspector).</p>	<ul style="list-style-type: none"> A compacted facility bottom will require scarification to a depth of 300 mm. A silt contaminated facility bottom may require over-excavation, consult design team.

Table 6. Construction Sequencing for Permeable Pavement Facilities







Item	Construction Task	How to Implement	Photo	Purpose	Inspection Items	Inspection Timing	Inspection Responsibility	Potential Corrective Actions
4	Subgrade	<ul style="list-style-type: none"> Ensure subgrade matches design. For parking lots typically bed bottoms are level, for road applications typically bed bottoms parallel the road surface. Equipment should avoid driving on bottom of facility. Protect from sediment once complete. 	 <p>Rough grade matches design, site stable.</p>	<ul style="list-style-type: none"> Bottom of facility is typically level to ensure even infiltration and prevent premature clogging, settlement or ponding. Driving on the subgrade can compact native soils and reduce infiltration. 	<ul style="list-style-type: none"> Rough grade matches design. Surface is uniform. No sediment or debris accumulation has taken place. <p>Note: Survey verification of grades is required.</p>	<ul style="list-style-type: none"> Inspect when completed. 	Owner's Representative (engineering inspector).	<ul style="list-style-type: none"> If facility bottom is not level, confirm that this is the design intent or instruct contractor to level. If sediment or debris accumulation has taken place, instruct to remove prior to installation or geotextile or sub-base media.
5	Geotextile <i>(if specified)</i>	<ul style="list-style-type: none"> Ensure geotextile is sufficiently sized to provide 400 mm overlap where ends meet. Secure geotextile 1m outside of excavation. 	 <p>Geotextile on trench walls. Excess can protect rock during rain event.</p>	<ul style="list-style-type: none"> Geotextile keeps trench walls moist and prevents material from sluffing off and contaminating drainage layers. Excess fabric can be wrapped around rock trenches to provide emergency ESC during rain events. 	<ul style="list-style-type: none"> Geotextile is clean and appropriately sized to meet design needs. Geotextile has been installed as per design. Ends have been overlapped by 400mm. 	<ul style="list-style-type: none"> Confirm material meets specifications once it arrives on site. Inspect installation of fabric when installation commences and once completed. 	Owner's Representative (engineering inspector).	<ul style="list-style-type: none"> Instruct to install as per design. Instruct to overlap ends by 400mm. Instruct to remove and replace any contaminated geotextile.
6	Underdrain <i>(if specified)</i>	<ul style="list-style-type: none"> Install to grade and place clean-out/inspection chambers as per design. The up-gradient end of the underdrain should be capped. 	 <p>Perforations match design, cleanout facing downstream.</p>	<ul style="list-style-type: none"> Underdrains provide additional de-watering. They are often laid on very flat grades, so precision is key to ensure no standing water in the pipe. 	<ul style="list-style-type: none"> Direction of perforations matches design detail. Size and material of pipe matches specifications. Placement and orientation of cleanouts are correct. Grade of pipe matches design and pipe is free of sags. 	<ul style="list-style-type: none"> Confirm material and size once it arrives on site. Inspect once installation commences and following completion of work. 	Owner's Representative (engineering inspector).	<ul style="list-style-type: none"> Direct contractor to correct pipe orientation, material or size if necessary. Have pipe re-laid if grade does not match design.

Table 6. Construction Sequencing for Permeable Pavement Facilities

Item	Construction Task	How to Implement	Photo	Purpose	Inspection Items	Inspection Timing	Inspection Responsibility	Potential Corrective Actions
7	Sub-base Reservoir	<ul style="list-style-type: none"> Place in 150mm lifts as per design. Compact with vibratory roller in static mode until no visible aggregate movement, avoid excessive equipment movement over reservoir layer. Do not crush aggregate with roller. 	 <p>Sub-base reservoir placed around underdrain.</p>	<ul style="list-style-type: none"> Vibratory mode could crush aggregate and produce fines. 	<ul style="list-style-type: none"> Rock gradation is as per design. Depth of placement matches design. Rock hasn't been crushed during compaction. 	<ul style="list-style-type: none"> Confirm material and gradation once it arrives on site. Inspect once installation commences and following completion of works. 	Owner's Representative (engineering inspector).	<ul style="list-style-type: none"> Do not approve installation of rock not matching design. Instruct contractor to operate equipment in static mode.
8	Base Course	<ul style="list-style-type: none"> Place in 150mm lifts as per design. Compact with vibratory roller in static mode until no visible aggregate movement. Do not crush aggregate with roller. Porous Concrete only: pre-moisten immediately before placement of concrete until wet but no standing water is present. 	 <p>Conceptual: Base course over sub-base reservoir.</p>	<ul style="list-style-type: none"> Vibratory mode could crush aggregate and produce fines. Porous Concrete only: mixture arrives drier than traditional concrete and is sensitive to changes in moisture and temperature. Pre-moistening base course prevents this layer from drawing moisture out of the concrete mixture and causing pre-mature curing. 	<ul style="list-style-type: none"> Rock gradation is as per design. Depth of placement matches design. Rock hasn't been crushed during compaction. Porous Concrete only: base course has been pre-moistened and no standing water is present. 	<ul style="list-style-type: none"> Confirm material and gradation once it arrives on site. Inspect once installation commences and following completion of works. 	Owner's Representative (engineering inspector).	<ul style="list-style-type: none"> Do not approve installation of rock not matching design. Instruct contractor to work from outside facility, unless previously approved. Instruct contractor to pre-moisten base course.
9	Filter Course or Bedding Layer	<ul style="list-style-type: none"> Place as per design. Do not crush aggregate with roller. Porous Concrete only: no bedding layer is used. 	 <p>Conceptual: Filter course over base course.</p>	<ul style="list-style-type: none"> Vibratory mode could crush aggregate and produce fines. 	<ul style="list-style-type: none"> Rock gradation is as per design. Depth of placement matches design. Rock hasn't been crushed during compaction. 	<ul style="list-style-type: none"> Confirm material and gradation once it arrives on site. Inspect once installation commences and following completion of works. 	Owner's Representative (engineering inspector).	<ul style="list-style-type: none"> Do not approve installation of rock not matching design. Instruct contractor to work from outside facility, unless previously approved.

Install pavement as described in Section 4.4.2.1 to 4.4.2.4

Table 6. Construction Sequencing for Permeable Pavement Facilities

Item	Construction Task	How to Implement	Photo	Purpose	Inspection Items	Inspection Timing	Inspection Responsibility	Potential Corrective Actions
10	Pre-treatment	<ul style="list-style-type: none"> Install sod ensuring not to contaminate pavement surface in the process. 	 <p>Border sod installed and stable.</p>	<ul style="list-style-type: none"> Topsoil from sod installation can prematurely contaminate the pavement surface and reduce infiltration capacity. 	<ul style="list-style-type: none"> Pre-treatment is installed as per engineering plans and is protected (unless otherwise stated). 	<ul style="list-style-type: none"> Inspect once installed. 	Owner's Representative (engineering inspector).	<ul style="list-style-type: none"> If no pre-treatment specified, review with design team for assurance or approval.

4.4.2.1 Porous Asphalt

Weather: Minimum air temperature should be 10°C. This ensures the surface does not stiffen before compaction.

Transport to site: Use a clean vehicle with smooth dump beds sprayed with a non-petroleum release agent and cover mix. This prevents mixture from adhering to dump bodies and ensures the mix does not cool.

Laying temperature: Temperature should be between 110°C and 127°C (230°F and 260°F).

Lifts: Lay in a single lift on filter course.

Compaction: Compact with one or two passes of a 10-ton roller once surface is cool enough to resist the weight of the roller. Additional rolling could cause a reduction in asphalt porosity.

Joints: Whenever spreading is interrupted long enough for the pavement to stabilize a joint should be constructed. When paving resumes, the joint should be coated with emulsified asphalt prior to placing pavement. This ensures a continuous bond between old and new mixtures.



4.4.2.2 Porous Concrete

Ambient temperature and wind: Do not install on windy days or weeks forecasted to be above 30°C during the seven days following placement. Severe winds and/or high temperatures can greatly reduce placement and consolidation time and may lead to raveling and reduced durability.

Setting forms: Ensure forms are wide enough and sturdy enough to hold the roller screed and that stakes will not impede roller screed movement.

Transport to site: The mix ages in the truck and may need to be re-dosed on site with water reducers and/or more hydration stabilizers. This can be difficult to proportion and smaller truck loads are recommended rather than on-site dosing.

Spacing material transport: Typically, trucks can be sent every 15-20 minutes, but the crew must establish a rhythm first to avoid trucks waiting on site. Material perishes much faster than conventional concrete.

Base course: Must be pre-wet to surface saturated dry (thoroughly wet with no standing water). Cement mix has a low water cement ratio and a dry subbase can remove water from the concrete mix and speed up curing.

Placement: Mix is typically stiffer and drier than traditional concrete and requires chute delivery with a dedicated individual moving material down the chute. Ensure the crew does not walk on the mix.

Initial Consolidation: Rakes are used to pre-level material and initial consolidation is typically done with a hydraulic roller screed while maintaining a 'wave' of material in front of the screed to prevent divots.

Final Consolidation: Typically, cross-rolled with hand rollers and hand tamped along the sides.

Joints: Construct joints with a joint roller immediately after final consolidation always rolling one way over the pavement.

Curing: Immediately after final consolidation and/or joint construction, cover concrete with plastic sheeting and anchor. Curing will take 7 days and concrete will need to be inspected daily and if the surface is not wet it needs to be watered.



4.4.2.3 Permeable Unit Pavers

Weather: Do not install in rain or snow.

Placement: Pavers may be installed by hand for small sections or mechanically for large areas. Replace any damaged pavers before installing joint aggregate.

Edge gaps: Typically filled with cut pavers. Ensure to cut pavers away from pavement area as sawing can create dust and fines and reduce infiltration capacity.

Joint aggregate: Be sure to place joint aggregate and sweep off excess prior to compaction. Compacting can crush excess stone on the surface and create fines that will clog the pavement.

Compaction: Vibrate and seat pavers with a plate vibrator capable of low-amplitude 5,000 lbf (22-kN) compaction force at 75 to 95 Hz. Compact once there is a complete surface with edge pavers or compact to within 1.8m of the laying face before ending each day's work.



4.4.2.4 Open Grid Pavers

Placement: Install grid by hand for small sections or mechanically for large areas. Cut irregular shapes away from pavement surface.

Aggregate option: Place aggregate and sweep until level.

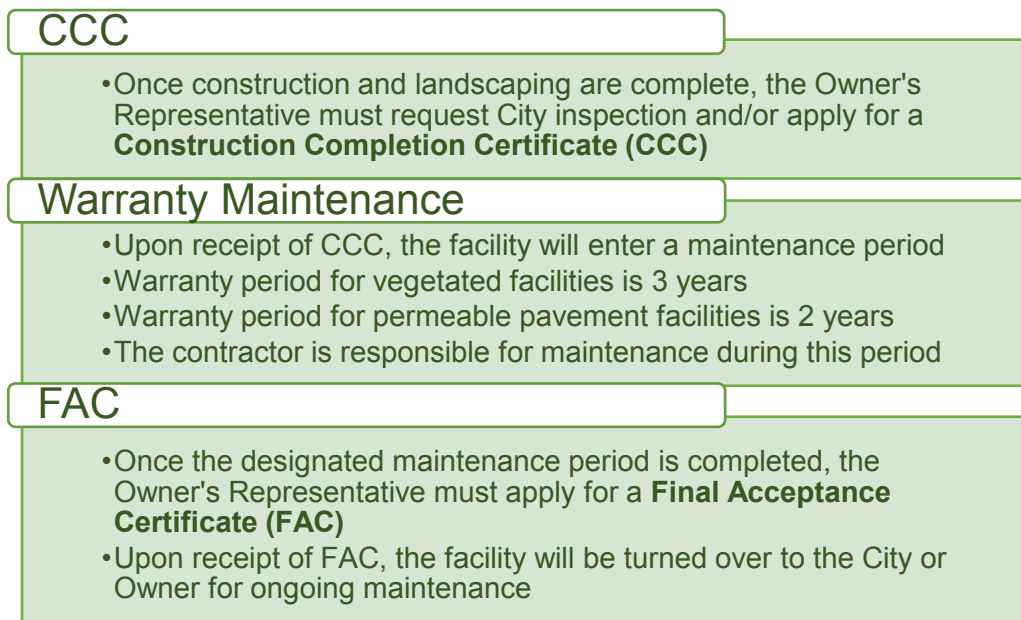
Turf option: Fill cells with approved topsoil and seed.



5 PROJECT ACCEPTANCE (CCC THROUGH FAC)

As shown below, project acceptance for LID facilities is in line with that employed for all City facilities. Similar to acceptance of stormwater management ponds, multiple City inspectors may be involved before the Construction Completion Certificate (CCC) or Final Acceptance Certificate (FAC) is granted.

The specific responsibilities of each business area will vary depending on the facility type. However, Drainage will serve as the Primary Approving Authority for **all** LID facilities owned by the City, directly connected to City drainage infrastructure or for which the City will assume responsibility upon acceptance. Hence, Drainage is responsible for (1) coordinating needed inspections, (2) final sign-off on CCC and (3) final sign-off on FAC at which time the facility will be turned over to the City or Owner for ongoing maintenance.



Once construction and landscaping are complete, the Owner's Representative must request City inspection and/or apply for a Construction Completion Certificate. This signifies the start of a standard 3-year maintenance period for vegetated facilities and a 2-year maintenance period for permeable pavement facilities, at the end of which the Owner's Representative must apply for a Final Acceptance Certificate.

This section identifies the responsibilities of key parties during the CCC/FAC process, describing how and by whom the CCC and FAC checklists are to be used.

5.1 Construction Completion Certificate (CCC)

Drainage is the **Primary Approving Authority** for all LID facilities and is responsible for coordinating CCC inspections and for final signoff on the certificate.

A two-page CCC checklist for each facility type is included in **Appendix A**.

For vegetated facilities the checklist is to be completed as follows:

- Page 1 includes all items relating to soft landscaping (site stabilization and erosion and sediment control, facility surface, plant material, mulch, seed and sod). Labeling for all landscape related inspection items is preceded by “L”. This first page is intended to be filled out by an inspector from **Parks**. If trees are present in the design, an inspector from **Urban Forestry** may also be required.
- Page 2 includes items relating to administration and drainage including starting the CCC process, concrete work, grading and underdrains. Note that, while drain flushing and CCTV inspection is labeled as “optional”, this step is preferred for all facilities containing an underdrain. Labeling for these inspection items is preceded by a “D”. This page is intended to be completed by an inspector from **Drainage**.

For permeable pavement facilities the checklist is to be completed as follows:

- Page 1 includes all items relating to the facility pre-inspection (site stabilization and erosion and sediment control, concrete work, grading, underdrains, and facility surface). This first page is intended to be filled out by an **Owner’s Representative** with an engineering background.
- Page 2 includes all items relating to the City inspection. Note that, while drain flushing and CCTV inspection is labeled as “optional”, this step is preferred for all facilities containing an underdrain. This page is intended to be filled out by **Drainage** and **Transportation** together.

5.2 Warranty Period Maintenance

Facility maintenance during the warranty period is the responsibility of the **Contractor** and includes all tasks identified in **Section 6**. If maintenance work is being sub-contracted out, it is the responsibility of the Prime Contractor to ensure that a Sub-contractor that is suitably educated or experienced in LID facility maintenance is retained. It is the responsibility of the **Owner's Representative** to confirm that proper maintenance is taking place during the warranty period.

It is recommended that the following be confirmed by the **Owner's Representative** during and after the first rainfall event:

- Drainage area matches design
- Runoff easily enters the facility
- Pre-treatment is functioning and there is no evidence of sediment entering planting bed zone
- Excessive erosion is not occurring (side slopes, bed zone, inlet/outlet)
- Flow spreads evenly over the planting bed zone
- Grade control structures are performing as designed
- Pondered water does not exceed design depth and drains within the design time frame from the end of the storm event

5.3 Final Acceptance Certificate (FAC)

As with CCC issuance, **Drainage** will continue to coordinate the FAC process. However, Drainage and Parks will issue separate FAC's. Drainage will inspect the facility and issue their FAC first, followed by a Parks inspection (within the next 30 days of Drainage issuance) and FAC issuance. This will ensure that deficiency correction to achieve Drainage FAC (and potential plant material disturbance) does not compromise a previously issued Parks FAC.

A two-page FAC checklist for each facility is included in **Appendix A**.

For vegetated facilities the checklist is to be completed as follows:

- Page 1 includes all items relating to soft landscaping (site stabilization and erosion and sediment control, facility surface, plant material, mulch, seed and sod). Labeling for all landscape related inspection items is preceded by "L". This first page is intended to be filled out by an inspector from **Parks**. If trees are present in the design, an inspector from **Urban Forestry** may also be required.
- Page 2 includes items relating to administration and drainage including starting the FAC process, concrete work, grading and underdrains. Note that, while drain flushing and CCTV inspection is labeled as "optional", this step is preferred for all facilities containing an underdrain. Labeling for these inspection items is preceded by a "D". This page is intended to be completed by an inspector from **Drainage**.

For permeable pavement facilities the checklist is to be completed as follows:

- Page 1 includes all items relating to the facility pre-inspection (site stabilization and erosion and sediment control, concrete work, grading, underdrains, and facility surface). This first page is intended to be filled out by an **Owner's Representative** with an engineering background.
- Page 2 includes all items relating to the City inspection. Note that, while drain flushing and CCTV inspection is labeled as "optional", this step is preferred for all facilities containing an underdrain. This page is intended to be filled out by **Drainage** and **Transportation** together.

Coordination of Parks and Drainage FAC Issuance:

- Parks and Drainage shall issue separate FAC's
- Parks shall not issue an FAC until the Drainage FAC has been issued
- The allowable time between issuance of Drainage FAC and Parks inspection and confirmation that shall not exceed 30 days

6 MAINTENANCE

This section provides an overview on the general maintenance activities associated with LID facilities and the recommended level of training and education required to perform these activities. This section includes a comprehensive maintenance table which specifies inspection points, potential issues, maintenance activities, the suggested level of training (low, medium or high) to perform each maintenance activity and a recommended maintenance frequency. The maintenance activities outlined throughout this document are intended for both contractor and City maintenance crews as applicable during the project acceptance and post-FAC maintenance periods.

6.1 Staff Training and Education

Training specifically tailored to the maintenance of LID facilities within the City of Edmonton is recommended for all disciplines involved, not only those performing maintenance on LID facilities, but also those responsible for the design, construction and inspection of LID facilities. **Table 7** provides a summary of the expectations associated with each training level. Training is intended to provide the following benefits necessary for well-performing LID facilities:

- Clear understanding by maintenance personnel of the required maintenance steps and procedures, reducing levels of uncertainty and enhancing independence/reduction in senior supervision
- Clear understanding by designers of the maintenance issues common to the various LID facility types within the City to be addressed and minimized/avoided within the design process
- Additional level of expertise for design reviewers to identify potential maintenance issues when reviewing drawing packages and contract documents
- Greater understanding by the construction industry of the maintenance requirements of LID facilities, reducing levels of uncertainty and ideally decreasing bid costs
- Greater knowledge of maintenance requirements by all parties may assist in the identification of any correlations between construction methods and common maintenance issues

Table 7. Recommended Training Levels for LID Maintenance

		Typical Activities		
		Parks	Drainage	Transportation
Training Level	Low – New hire with basic LID orientation	<ul style="list-style-type: none"> trash/debris/ sediment removal raking seeding grass replacing sod top-ups to mulch or soil emptying trash cans adding trash cans 	<ul style="list-style-type: none"> trash/debris/ sediment removal emptying trash cans 	<ul style="list-style-type: none"> snow removal changes to snow storage location(s)
	Medium – 2-5 years maintenance experience with LID	<ul style="list-style-type: none"> weeding (non-native species present) removal, addition or replacement of mulch/soil/plant material 	<ul style="list-style-type: none"> minor concrete repairs regrading inlet modification pipe flushing cleaning pre-treatment devices 	<ul style="list-style-type: none"> minor concrete repairs regrading cleaning pre-treatment devices
	High – Highly specialized personnel with relevant education (e.g. post-secondary background in horticulture or engineering)	<ul style="list-style-type: none"> pruning treat diseased plants stabilization via matting or stone installation of flow spreaders improvements in contributing drainage area replanting of entire facility weeding (native species present) 	<ul style="list-style-type: none"> stabilization via matting or stone improvements or revision to contributing drainage area inlet/outlet replacement major concrete repairs concrete replacement 	<ul style="list-style-type: none"> major concrete repairs concrete replacement

6.2 Pre-treatment Facilities

Pre-treatment facilities, as their name implies, are structures designed to slow the velocity of runoff and separate out sediments and other unwanted materials such as garbage, prior to runoff entering the main LID facility. All pre-treatment facilities require regular maintenance to prevent damage to the main LID facility. The type and frequency of maintenance is dependent upon the type of pre-treatment facility and the character of the surrounding drainage area.

- General maintenance activities are identified in **Table 8**
- Facilities receiving road or parking lot runoff require maintenance each spring, immediately following snow melt and after major events
- Facilities receiving overland runoff require maintenance on an as-needed basis as determined by visual inspection

Table 8. Pre-treatment Maintenance






Type	Photo	Maintenance Activity	Responsibility
Sod Filter Strip		<ul style="list-style-type: none"> • Removal of sediment/grit at pavement edge • Rake out sediment/grit from sod filter strip if it has accumulated 	Parks or Transportation (dependent upon location of facility)
Hardscape Forebay		<ul style="list-style-type: none"> • Sweeping or removal with shovel 	Drainage
Catchbasin Sump		<ul style="list-style-type: none"> • Vac-truck suction 	Drainage

Table 8. Pre-treatment Maintenance

Type	Photo	Maintenance Activity	Responsibility
Gravel Diaphragm		<ul style="list-style-type: none"> Remove grit and weeds Periodic replacement 	Parks
Stone Splash Pad (Note: prevents erosion but not sedimentation)		<ul style="list-style-type: none"> Raking or sweeping 	Parks or Transportation (depending upon location of facility)
Oil and Grit Separator (OGS)		<ul style="list-style-type: none"> Vac-truck flushing and suction 	Drainage
Pre-treatment Chamber		<ul style="list-style-type: none"> Vac-truck flushing and suction 	Drainage

6.3 Vegetation Maintenance and Erosion and Sediment Control

Vegetative cover is vital for the successful operation of an LID facility. In addition to aesthetic and wildlife habitat values, established plant material provides erosion control, encourages deposition of sediments, may uptake pollutants and assists in water draw-down through evapotranspiration within the facility.

Procedures for maintaining vegetation within LID facilities do not vary greatly from standard practices specified within the City of Edmonton Design and Construction Standards. The primary differences are an increase in the frequency of maintenance required to ensure a continuous vegetative cover for erosion control, and restrictions on the use of fertilizers and pesticides to prevent water and soil contamination. Some projects will require more maintenance than others depending upon the type of facility and type of vegetation installed.

General vegetation maintenance activities are outlined in **Table 9**.

Table 9. General Vegetation Maintenance

Maintenance Activity	Frequency or Trigger
Watering	<ul style="list-style-type: none"> • Water plant material and turf frequently and deeply for the first 1 to 2 months following installation to aid in successful establishment • After 1 to 2 months, put plant material on a reduced frequency, deep watering schedule, to encourage deep rooting • Bi-weekly monitoring will be required to ensure plant material is thriving and schedule watering as required • Water as required to maintain plant material in healthy condition • The installation of a temporary automatic irrigation system is suggested for establishment watering
Fertilization	<ul style="list-style-type: none"> • Fertilizers directly impact downstream water bodies by contributing to eutrophication; therefore, fertilizer application should be avoided or an environmental approach to application should be taken • Fertilization can cause facility contamination and increase nutrient levels within the soils, both of which negatively impact how the facility functions • If the use of a fertilizer is proposed, it must be approved by Parks prior to application • Compost can be used to enhance vegetation within LID facilities but it should be selected and used with caution (refer to the City's <i>Low Impact Development Best Management Practices Design Guide v1.1</i>, Section 6.2 Soil Amendments for more information)

Table 9. General Vegetation Maintenance

Maintenance Activity	Frequency or Trigger
Replacement of dead or dying plant material	<ul style="list-style-type: none"> Once plant material has had time to leaf out in the spring, determine percentage of dead or unhealthy material, remove this plant material from the facility, and replace with either the same species or with an approved substitution When replacing plant material, take note if one species is being replaced more than others, a species substitute (subject to approval) may be required It is beneficial to ensure that plant coverage percentage aligns with design to ensure the facility is functioning at optimal capacity (plant coverage percentage for each year that the facility is under maintenance, and when fully operational, will be specified at the design phase) For practices with a herbaceous/meadow planting design, bush-hog the practice in early spring to achieve the objective of full coverage by herbaceous plants Continually monitor plant material throughout the growing season (April to October)
Pruning	<ul style="list-style-type: none"> Inspect and prune plant material semi-annually in the spring and fall to avoid unwanted disease Refer to the City of Edmonton's Design and Construction Standards for acceptable times to prune certain species
Turf repair	<ul style="list-style-type: none"> Immediately apply topsoil, erosion control fabric and seed or replacement sod to bare patches and eroded areas in turf to avoid additional erosion Continually monitor turf throughout the growing season (April to October)
Treating pests and disease	<ul style="list-style-type: none"> When disease or pests are identified, treatment shall be provided by a licensed applicator Install wire mesh or plastic guards around trees to deter animals from stripping bark; install fence or barrier around shrubs, perennials or plugs as required Monitor for pests and disease during regular maintenance activities
Tree stake adjustment	<ul style="list-style-type: none"> Adjust and/or loosen stakes annually or as needed; stakes should not be left on the tree for more than three growing seasons

Table 9. General Vegetation Maintenance

Maintenance Activity	Frequency or Trigger
Weed control	<ul style="list-style-type: none"> Remove weeds bi-monthly Hand pick weeds from plant beds and turf areas Weeds must be controlled as per the Weed Act Herbicides are toxic to aquatic ecosystems and should not be used unless all other options have been implemented without success and the City has approved the use
Mowing	<ul style="list-style-type: none"> Mow sod areas on a monthly basis during the growing season - naturalized seed areas shall only be mowed for weed control Push mowing is preferred to avoid compaction
Removal of debris and sediment	<ul style="list-style-type: none"> Inspect facilities and remove all debris each spring Inspect the contributing drainage area on a bi-monthly basis for sources of sediment Inspect the facility on a bi-monthly basis to ensure debris and sediment are not causing blockages and rectify issues immediately
Erosion control	<ul style="list-style-type: none"> During spring cleanup and after all major storm events, inspect plant beds and turf areas for rill and gullies and repair immediately Significant rilling should be investigated further with the City maintenance inspector to determine the cause(s) and develop mitigation efforts Repairs may include topsoil, erosion control fabric, sod, seed, mulch and plant material
Mulch top up	<ul style="list-style-type: none"> Annually (or as needed) check mulched areas for bare patches and top up to approved depth where needed (this can be coordinated with spring cleanup activities)

6.4 Underdrains and Catchbasins

Once operational, inspect all underdrains and catchbasins on a monthly basis (or following a significant storm event) to ensure facility is performing as anticipated:

- If no debris or excess sediment is encountered within the first season (April to October), incorporate facilities into regular inspection and maintenance schedule
- If debris or excess sediment is noted, remove sediment and/or flush system as needed and inspect both the facility and contributing drainage area to determine source of sediment and take corrective action
- Check all access points to underdrain (e.g. pipe caps, catchbasin and drain covers) to ensure they are secure and accessible

6.5 Winter Maintenance

In cold climates, snow storage and de-icing are key considerations in maintaining facility integrity. Snow should never be stored in or on LID facilities due to the potential presence of salt or sand. Sand may clog infiltration practices and residual chlorides from the salt may be detrimental to plantings. If areas adjacent to a facility require the use of a de-icer, remove snow promptly and use a de-icer application with low chloride concentration.

6.6 Facility Specific Inspection and Maintenance

Inspection has been split into two general categories, the first being vegetated facilities and the second being permeable pavement facilities. Thus, two master maintenance tables have been created to summarize the inspection points for each of these categories. The inspection points are arranged by inspection zone. For vegetated facilities there are six inspection zones. For permeable pavement facilities there are two zones.

This information is provided as a reference for **City Inspection and Maintenance Crews**. Therefore, where components or materials are recommended for replacement, the use of City resources applies only to City-owned facilities. For private facilities, all maintenance activities and costs are the responsibility of the owner.

During the warranty period, it is the responsibility of the **Contractor** to ensure that the maintenance activities outlined herein are performed and parties are encouraged to use this document as a guide.

In the field, the information presented in this section is intended to be used hand-in-hand with the **Maintenance Inspection Checklists** provided in **Appendix A** and other typical maintenance inspection logs which may be used by maintenance crews.

6.6.1 Vegetated Facilities

The inspection zones are described below and shown on **Figure 4** through **Figure 7**. These figures are conceptual and serve to illustrate the general location of facility components and do not represent actual designs.

- **Contributing Drainage Area (CDA):** this is the catchment area for the facility. This may include sidewalks, roads, parking lots, lawns, etc. Critical inspection items in this zone are debris and sources of sediment.
- **Pre-treatment zone (PT):** this includes all forms of pre-treatment for the facility. This may be a sod filter strip, riprap, a hardscaped forebay or any other pre-treatment devices as listed in **Section 6.2**. Critical inspection items for this zone are debris and sediment accumulation and structural integrity.
- **Inlet zone (IZ):** this is where runoff enters the facility such as through a curb cut. Critical inspection items for this zone are flow capture (i.e. flow is not by-passing the inlet), inlet obstruction, inlet erosion (i.e. erosion at and downstream of the inlet) and structural integrity.
- **Boundary zone (BZ):** this includes the facility outer boundary and side slopes. Critical inspection items for this zone are ensuring that the facility size matches design, trash and debris are not accumulating and the side slopes are not eroding.
- **Bed and Vegetated zone (BVZ):** this includes the facility bottom and vegetation. Critical inspection items for this zone are amended soil specification verification, debris and/or trash, erosion, sedimentation, mulch depth and condition, plant material health, density and coverage, presence of weeds and/or invasive species and riprap condition (if specified).

- Outlet zone (OZ): this includes a spill overflow, an overflow outlet drain, and an underdrain (if specified). Critical inspection items for this zone are outlet obstruction, outlet structural damage, and pipe condition and/or loss of capacity.

In addition to the above inspection zones, overall **facility performance (PI)** and **winter inspection (WI)** are included as additional inspection groups.

For each inspection zone, the table includes guidance on rating criteria (pass, minor, moderate or severe), inspection activities, potential maintenance actions, maintenance responsibility, inspection frequency and recommended training level for each inspection point. The associated training level for each activity is in keeping with the information presented in **Table 7**.

Figure 4. Bioretention Inspection Zones

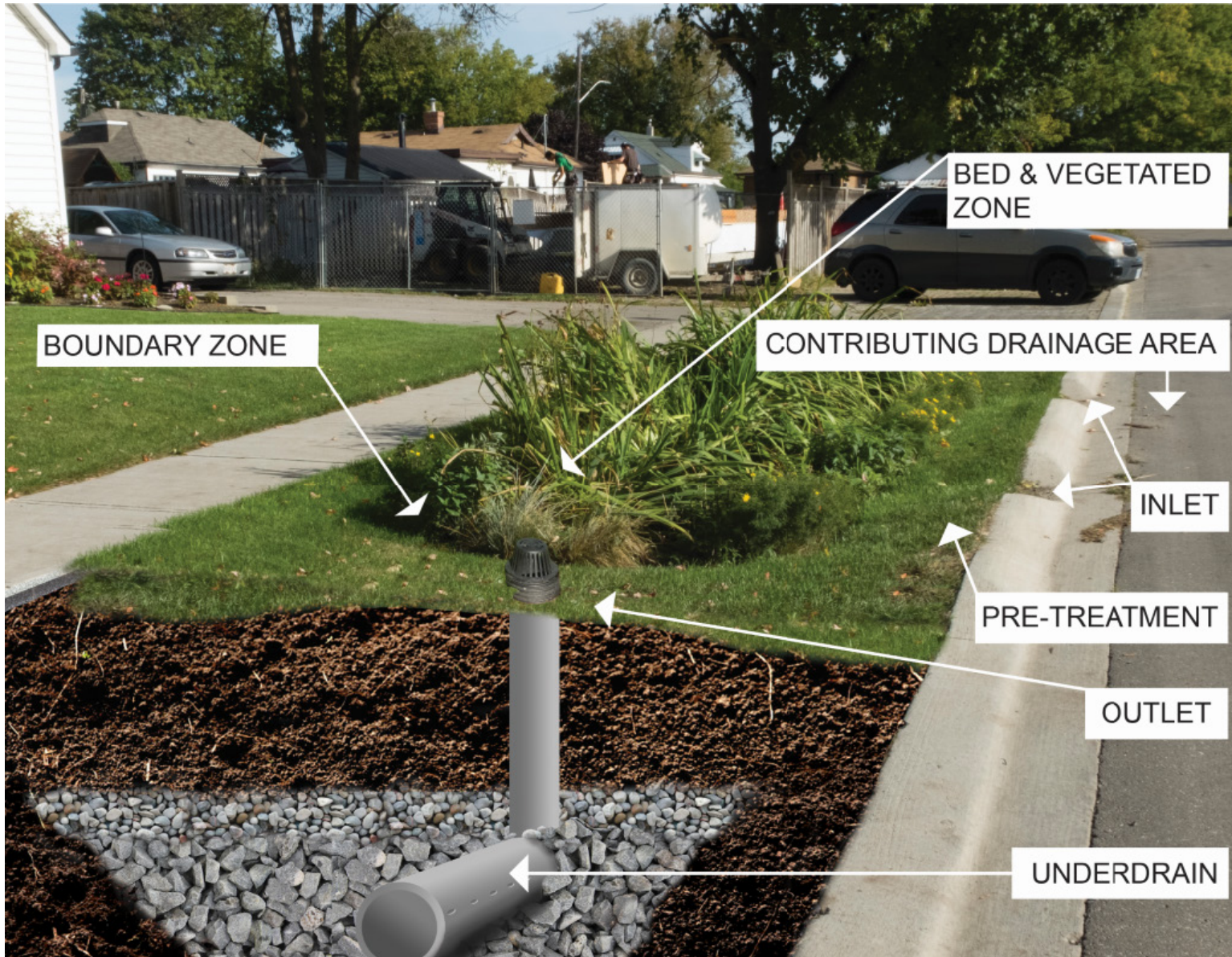


Figure 5. Bioswale Inspection Zones



Figure 6. Naturalized Drainage Way Inspection Zones

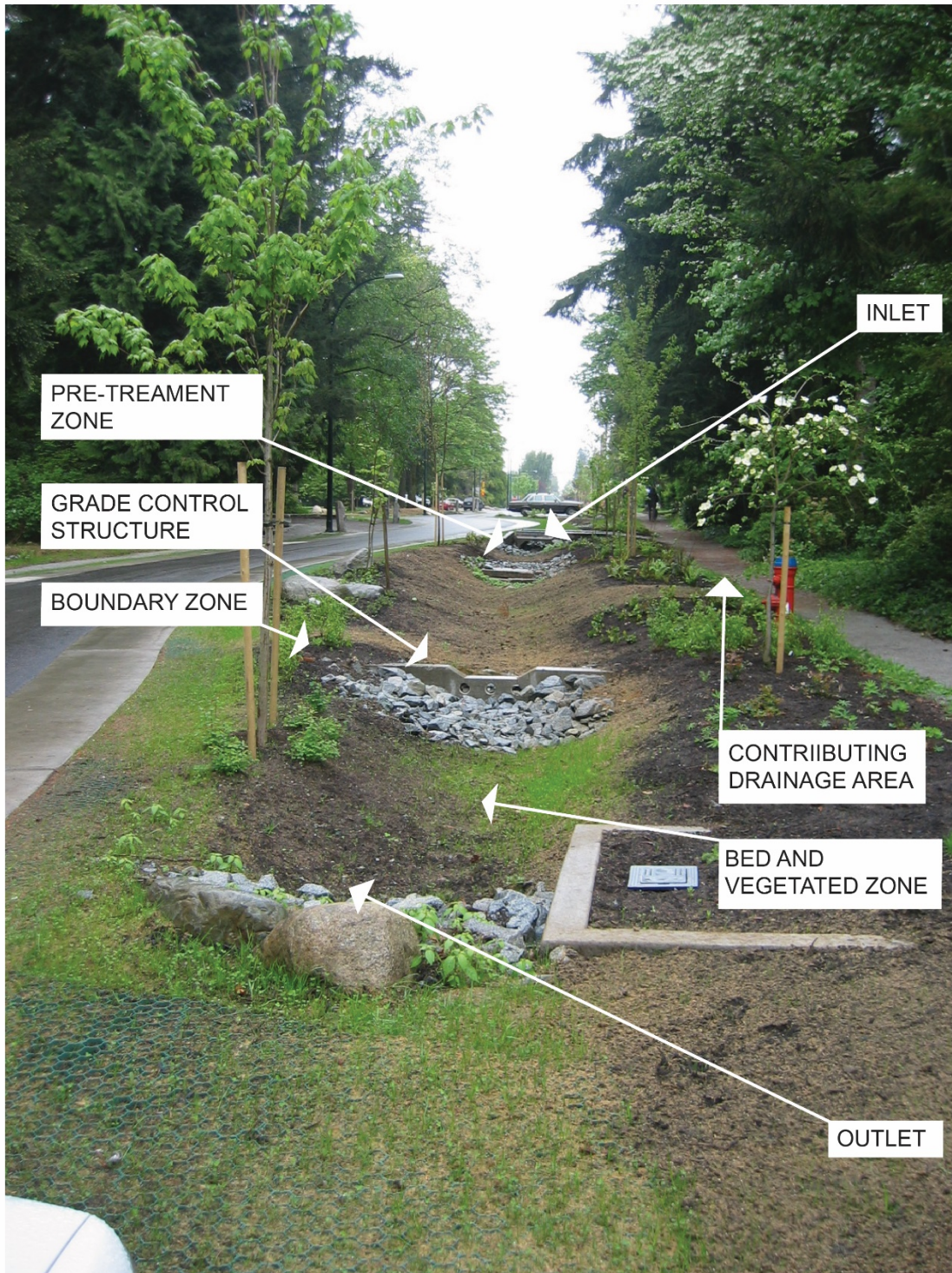


Figure 7. Box Planter Inspection Zones



Table 10. Maintenance and Inspection – Master Table for Bioretention, Bioswale, Naturalized Drainage Way and Box Planter Facilities

#	Item	Description of Condition				Maintenance Responsibility	Inspection Frequency
		Pass	Minor	Moderate	Severe		
VISUAL INSPECTION							
CONTRIBUTING DRAINAGE AREA (CDA)							
CDA-1	Free of debris, trash, leaf fall	No evidence of trash, debris or leaf fall.	Some trash or debris.	Noticeable trash or debris that is affecting facility function.	Trash and debris have negatively impacted or halted facility function.	Parks or Transportation	Quarterly
	Potential Action Required By Inspector	None	Inform maintenance team to have trash removed on next maintenance round in the area	<ul style="list-style-type: none"> Inform maintenance team to have trash immediately removed Evaluate CDA for sources that can be reduced 	<ul style="list-style-type: none"> Inform maintenance team to have trash immediately removed Evaluate CDA for sources that can be reduced Evaluate if additional pre-treatment needed Increase inspection and maintenance frequency for area 		
	Potential Action Required By Maintenance Team	None	Remove trash and debris	<ul style="list-style-type: none"> Remove trash and debris Empty nearby trash cans Assess need and add additional trash cans Clear leaves Prune trees 	<ul style="list-style-type: none"> Remove trash and debris Empty nearby trash cans Assess need and add additional trash cans Clear leaves Prune trees 		
	Level of Training Required by Maintenance Team	N/A	Low	Medium/High	Medium/High		
CDA-2	No sources of sediment present	No sources of sediment evident in drainage area.	Several bare patches in drainage area.	Considerable amount of drainage area is unstable or contains sediment.	Considerable area of drainage area is unstable OR Drainage area contains substantial amount of sediment (e.g. stockpile or winter grit).	Parks	Quarterly ~ After spring melt ~ After major storm event
	Potential Action Required By Inspector	None	Inform maintenance team to seed or sod bare patches on next maintenance round	<ul style="list-style-type: none"> Inform maintenance team to immediately remove any sediment in drainage area Instruct maintenance team to stabilize any bare patches 	<ul style="list-style-type: none"> Inform maintenance team to immediately remove any sediment in drainage area Instruct maintenance team to stabilize any bare patches Review facility for sedimentation Review drainage area for sources of erosion 		
	Potential Action Required By Maintenance Team	None	Stabilize area on next trip	Remove sediment and stabilize area	<ul style="list-style-type: none"> Remove sediment from drainage area and/or facility Stabilize any bare patches or areas causing erosion 		
	Level of Training Required by Maintenance Team	N/A	Low	Low	Low		

Table 10. Maintenance and Inspection – Master Table for Bioretention, Bioswale, Naturalized Drainage Way and Box Planter Facilities

#	Item	Description of Condition				Maintenance Responsibility	Inspection Frequency
		Pass	Minor	Moderate	Severe		
PRE-TREATMENT							
PT-1	Requiring clean-out	Free of sediment, trash or debris.	Slight accumulation of sediment, trash or debris.	Accumulation of sediment, trash or debris is reducing inlet capacity.	Accumulation of sediment, trash or debris has blocked inlet to facility. OR Facility lacks pre-treatment and inlet is entirely clogged.	Parks	Semi-annually
	Potential Action Required By Inspector	None	Inform maintenance team to have blockage removed on next maintenance round in the area	<ul style="list-style-type: none"> Inform maintenance team to have blockage immediately removed Evaluate CDA for sources that can be reduced 	<ul style="list-style-type: none"> Inform maintenance team to have blockage immediately removed Evaluate CDA for sources that can be reduced Evaluate if additional pre-treatment needed Increase inspection and maintenance frequency for area 		
	Potential Action Required By Maintenance Team	None	Remove blockage	<ul style="list-style-type: none"> Remove blockage Empty nearby trash cans Add additional trash cans Clear leaves Prune trees 	<ul style="list-style-type: none"> Remove blockage Empty nearby trash cans Add additional trash cans Clear leaves Prune trees 		
	Level of Training Required by Maintenance Team	N/A	Low	Medium/High	Medium/High		
PT-2	Structural integrity <i>(applicable to hardscaped or proprietary pre-treatment only)</i>	Concrete or structure free of cracks, chips and other damage.	Some isolated blemishes (cracks and chips) are present.	Several isolated areas requiring full repair or replacement.	Major problems present throughout facility, full repair or replacement needed.	Drainage or Transportation <i>(if in right-of-way)</i>	Annually (as needed if maintenance reports indicate issue)
	Potential Action Required By Inspector	None	Blemishes may be recommended for repair for aesthetic purposes only	<ul style="list-style-type: none"> Recommend repair of structural damages Determine source of damage (e.g. age, snow clearing, vandalism) Assess site during rain event conditions 	<ul style="list-style-type: none"> Recommend repair of structural damages. Determine source of damage (e.g. age, snow clearing, vandalism) Schedule visit to develop repair strategy with design team, if necessary Assess site during rain event conditions 		
	Potential Action Required By Maintenance Team	None	Blemish repair	Repair damages such as cracks or chips	Repair or replace damages		
	Level of Training Required by Maintenance Team	N/A	Medium	High	High		

Table 10. Maintenance and Inspection – Master Table for Bioretention, Bioswale, Naturalized Drainage Way and Box Planter Facilities

#	Item	Description of Condition				Maintenance Responsibility	Inspection Frequency
		Pass	Minor	Moderate	Severe		
INLET							
I-1	Inlet flow capture	No evidence that flow is by-passing inlet, runoff can easily enter facility.	Some runoff is bypassing inlet, evidenced by sediment accumulation, dampness or staining at inlet.	Flow is mostly by-passing inlet, evidenced by moderate sediment accumulation, dampness or staining at inlet or dehydrated plant material in facility.	Flow is completely by-passing inlet, evidenced by severe sediment and debris accumulation, ponding and staining at inlet and severely dehydrated plant material in facility.	Drainage	Semi-annually ~ After major storm event
	Potential Action Required By Inspector	None	Mark on inspection form and monitor in future inspections	Evaluate corrective actions and submit to maintenance team	Evaluate corrective actions and/or inlet replacement strategy and submit to maintenance team		
	Potential Action Required By Maintenance Team	None	None	Correct inlet flow capture via re-grading, lowering inlet, or re-shaping inlet	Correct inlet flow capture via re-grading, lowering inlet, re-shaping inlet or replacing inlet		
	Level of Training Required by Maintenance Team	N/A	N/A	Medium	High		
I-2	Inlet obstruction	Free of sediment, trash or debris.	Slight accumulation of sediment, trash or debris (≤10% capacity reduction).	Accumulation of sediment, trash or debris has begun affecting drainage path to facility (≤50% capacity reduction)	Accumulation of sediment, trash or debris has blocked drainage path to facility (≥50% capacity reduction).	Parks	Semi-annually ~ After major storm event
	Potential Action Required By Inspector	None	Inform maintenance team to have blockage removed on next maintenance round in the area	<ul style="list-style-type: none"> Inform maintenance team to have blockage immediately removed Evaluate CDA for sources that can be reduced 	<ul style="list-style-type: none"> Inform maintenance team to have blockage immediately removed Evaluate CDA for sources that can be reduced Evaluate if additional pre-treatment needed Increase inspection and maintenance frequency for area 		
	Potential Action Required By Maintenance Team	None	Remove blockage	<ul style="list-style-type: none"> Remove blockage Empty nearby trash cans Add additional trash cans Clear leaves Prune trees 	<ul style="list-style-type: none"> Remove blockage Empty nearby trash cans Add additional trash cans Clear leaves Prune trees 		
	Level of Training Required by Maintenance Team	N/A	Low	Medium	Medium		

Table 10. Maintenance and Inspection – Master Table for Bioretention, Bioswale, Naturalized Drainage Way and Box Planter Facilities

#	Item	Description of Condition				Maintenance Responsibility	Inspection Frequency
		Pass	Minor	Moderate	Severe		
I-3	Inlet erosion	No evidence of erosion or channelization.	Erosion is minor, such as displacing mulch or small bare patches.	Erosion is considerable, concentrated flows are evident (via gully formation) and scour is occurring.	Inlet protection is ineffective, considerable scour has occurred and the design may be insufficient.	Drainage	Semi-annually ~ After major storm event
	Potential Action Required By Inspector	None	<ul style="list-style-type: none"> Instruct maintenance team to re-distribute and top up mulch or soil media Monitor in future inspections 	<ul style="list-style-type: none"> Instruct maintenance team to re-distribute and top up mulch or soil media Instruct maintenance team to stabilize inlet 	<ul style="list-style-type: none"> Instruct maintenance team to re-distribute and top up mulch or soil media Instruct maintenance team to stabilize inlet Assess inlet design. Flows may need to be redistributed or slowed and inlet protection may need to be increased 		
	Potential Action Required By Maintenance Team	None	Re-distribute and top up mulch or soil media	<ul style="list-style-type: none"> Re-distribute and top up mulch or soil media Stabilize with fabric, matting, stone or other material as instructed by inspector 	<ul style="list-style-type: none"> Re-distribute and top up mulch or soil media Stabilize with fabric, matting, stone or other material as instructed by inspector Potentially, regrade inlet, install flow spreaders and/or addition inlet protection 		
	Level of Training Required by Maintenance Team	N/A	Low	High	High		
I-4	Inlet structural integrity (applicable to hardscaped inlet only)	Concrete free of cracks, chips and other damage.	Some isolated blemishes (cracks and chips) are present.	Several isolated areas requiring full repair or replacement.	Major problems present, full repair or replacement needed.	Drainage	Annually
	Potential Action Required By Inspector	None	Blemishes may be recommended for repair for aesthetic purposes only	<ul style="list-style-type: none"> Recommend repair of structural damages Determine source of damage (e.g. age, snow clearing, vandalism) Assess site during rain event conditions 	<ul style="list-style-type: none"> Recommend repair of structural damages. Determine source of damage (e.g. age, snow clearing, vandalism) Schedule visit to develop repair strategy with design team, if necessary Assess site during rain event conditions 		
	Potential Action Required By Maintenance Team	None	Blemish repair	Repair damages such as cracks or chips	Repair or replace damages		
	Level of Training Required by Maintenance Team	N/A	Medium	High	High		

Table 10. Maintenance and Inspection – Master Table for Bioretention, Bioswale, Naturalized Drainage Way and Box Planter Facilities

#	Item	Description of Condition				Maintenance Responsibility	Inspection Frequency
		Pass	Minor	Moderate	Severe		
BOUNDARY ZONE							
BZ-1	Facility size matches design	Facility surface area matches design.	Facility surface area differs from design by 5-10%.	Facility surface area differs from design by 10-25%.	Facility surface area differs from design by ≥25%.	Drainage Services and Parks	Annually
	Potential Action Required By Inspector	None	<ul style="list-style-type: none"> Estimate percentage of deviation in surface area Note if facility is smaller or larger 	<ul style="list-style-type: none"> Estimate percentage of deviation in surface area Note if facility is smaller or larger Identify cause of change (e.g. plant growth or death, sod migration) Instruct maintenance team to re-instate facility area Consider installation of edging 	<ul style="list-style-type: none"> Estimate percentage of deviation in surface area Note if facility is smaller or larger Identify cause of change (e.g. plant growth or death, sod migration) Re-design facility perimeter, if function and/or facility health is greatly impacted Instruct maintenance team to re-instate facility area Consider installation of edging 		
	Potential Action Required By Maintenance Team	None	None	<ul style="list-style-type: none"> Remove or add plant material (sod and/or plantings) Re-instate soil media and/or mulch Install edging 	<ul style="list-style-type: none"> Remove or add plant material (sod and/or plantings) Re-instate facility soil media and/or mulch to match design Install edging 		
	Level of Training Required by Maintenance Team	N/A	N/A	Medium	Medium		
BZ-2	Boundary debris and/or trash <i>(applicable to bioretention, bioswale, and naturalized drainage way facilities)</i>	No evidence of trash, debris or leaf fall.	Some trash or debris.	Noticeable trash or debris that is affecting facility function and aesthetic.	Trash and debris have negatively impacted or halted facility function and significantly decreased aesthetic.	Parks	Quarterly
	Potential Action Required By Inspector	None	Inform maintenance team to have trash removed on next maintenance round in the area.	<ul style="list-style-type: none"> Inform maintenance team to have trash immediately removed Evaluate CDA for sources that can be reduced 	<ul style="list-style-type: none"> Inform maintenance team to have trash immediately removed Evaluate CDA for sources that can be reduced Evaluate if additional pre-treatment needed Increase inspection and maintenance frequency for area 		
	Potential Action Required By Maintenance Team	None	Remove trash and debris.	<ul style="list-style-type: none"> Remove trash and debris Empty nearby trash cans Add additional trash cans Clear leaves Prune trees 	<ul style="list-style-type: none"> Remove trash and debris Empty nearby trash cans Add additional trash cans Clear leaves Prune trees 		
	Level of Training Required by Maintenance Team	N/A	Low	Medium/High	Medium/High		

Table 10. Maintenance and Inspection – Master Table for Bioretention, Bioswale, Naturalized Drainage Way and Box Planter Facilities

#	Item	Description of Condition				Maintenance Responsibility	Inspection Frequency
		Pass	Minor	Moderate	Severe		
BZ-3	Boundary side-slope erosion <i>(applicable only to bioretention, bioswale, and naturalized drainage way facilities)</i>	No evidence of scour or concentrated flows.	Erosion is minor, such as displacing mulch or small bare patches due to flow laterally entering facility.	Erosion is considerate, concentrated flows are evident and deep gully formation is occurring in several locations in the facility.	Erosion is severe, concentrated flows are evident and deep fully formation is occurring throughout the facility.	Parks	Semi-annually
	Potential Action Required By Inspector	None	Instruct maintenance team to re-distribute and top up mulch or soil media Monitor in future inspections	<ul style="list-style-type: none"> Instruct maintenance team to re-distribute and top up mulch or soil media Assess gradient of side slopes Consider stabilizing side slopes 	<ul style="list-style-type: none"> Instruct maintenance team to re-distribute and top up mulch or soil media Assess gradient of side slopes Consider re-design options to lower side slope gradient and/or increase erosion protection to slow flows 		
	Potential Action Required By Maintenance Team	None	Re-distribute and top up mulch and/or soil media	<ul style="list-style-type: none"> Re-distribute and top up mulch or soil media Stabilize with fabric, matting, stone or other material as instructed by inspector 	<ul style="list-style-type: none"> Re-distribute and top up mulch or soil media Stabilize with fabric, matting, stone or other material as instructed by inspector Re-grade side slopes; install flow spreaders and/or addition erosion protection 		
	Level of Training Required by Maintenance Team	N/A	Low	High	High		
BZ-4	Planter Box Structural Integrity <i>(applicable only to Box Planters)</i>	No damage to curbing evident.	Minor damage (small isolated cracks and/or chips).	Moderate damage (large cracks or chunks of concrete missing).	Severe deterioration affecting flow to facility (blocking flow or concentrating flow), safety, and aesthetics.	Transportation	Annually
	Potential Action Required By Inspector	None	<ul style="list-style-type: none"> Instruct maintenance team to seal cracks Monitor in future inspections 	<ul style="list-style-type: none"> Instruct maintenance team to seal cracks or patch chips Evaluate replacement of damaged curb Assess CDA, perform a performance inspection, evaluate winter ploughing activities to determine cause of facility damage 	<ul style="list-style-type: none"> Instruct maintenance team to replace damaged concrete Performance inspection - assess CDA and inlets to see if cause is standing water Assess winter ploughing activities 		
	Potential Action Required By Maintenance Team	None	Seal cracks in concrete	<ul style="list-style-type: none"> Seal cracks in concrete Patch chips Replace section of damaged curb 	<ul style="list-style-type: none"> Replace sections of damaged concrete Adjust inlets if necessary Adjust outlet elevation 		
	Level of Training Required by Maintenance Team	N/A	Medium	High	High		

Table 10. Maintenance and Inspection – Master Table for Bioretention, Bioswale, Naturalized Drainage Way and Box Planter Facilities

#	Item	Description of Condition				Maintenance Responsibility	Inspection Frequency
		Pass	Minor	Moderate	Severe		
BZ-5	Facility Enclosure	Enclosure is stable and free from damage.	Enclosure is unstable in isolated locations.	Enclosure is unstable and or vandalized throughout.	Enclosure needs full replacement.	Parks	Annually
	Potential Action Required By Inspector	None	Inform maintenance team to repair on next maintenance round.	Inform maintenance team to repair immediately.	<ul style="list-style-type: none"> Inform maintenance team to repair immediately. Investigate cause of deterioration. 		
	Potential Action Required By Maintenance Team	None	Repair enclosure.	Repair enclosure.	Repair enclosure.		
	Level of Training Required by Maintenance Team	N/A	Medium	Medium	High		
BED AND VEGETATED ZONE							
BVZ-1	Evidence amended soil does not meet design	Soil texture has high sand content.	Soil texture is sandy with some small clumps.	Soil texture and appearance (cohesive when wet) indicates low sand content and higher clay content.	Soil texture is clearly high in clay (cohesive when formed into a ball) and slow to drain when wet.	Parks	Annually
	Potential Action Required By Inspector	None	<ul style="list-style-type: none"> Evaluate if clay content negatively impacts function Monitor in future inspections 	<ul style="list-style-type: none"> Send soil sample for composition test. Perform infiltration test Replace or amend soil further 	<ul style="list-style-type: none"> Send soil sample for composition test Perform infiltration test Remove and replace soil 		
	Potential Action Required By Maintenance Team	None	None	Install new soil or amend current soil further	Install new soil		
	Level of Training Required by Maintenance Team	N/A	N/A	Medium	Medium		
BVZ-2	Bed zone debris and/or trash	No evidence of trash, debris or leaf fall.	Some trash or debris.	Noticeable trash or debris that is affecting facility function and aesthetic.	Trash and debris have negatively impacted or halted facility function and significantly decreased aesthetic.	Parks	Quarterly
	Potential Action Required By Inspector	None	Inform maintenance team to have trash removed on next maintenance round in the area	<ul style="list-style-type: none"> Inform maintenance team to have trash immediately removed Evaluate CDA for sources that can be reduced 	<ul style="list-style-type: none"> Inform maintenance team to have trash immediately removed Evaluate CDA for sources that can be reduced Evaluate if additional pre-treatment needed Increase inspection and maintenance frequency for area 		
	Potential Action Required By Maintenance Team	None	Remove trash and debris	<ul style="list-style-type: none"> Remove trash and debris Empty nearby trash cans Add additional trash cans Clear leaves Prune trees 	<ul style="list-style-type: none"> Remove trash and debris Empty nearby trash cans Add additional trash cans Clear leaves Prune trees 		
	Level of Training Required by Maintenance Team	N/A	Low	Medium/High	Medium/High		

Table 10. Maintenance and Inspection – Master Table for Bioretention, Bioswale, Naturalized Drainage Way and Box Planter Facilities

#	Item	Description of Condition				Maintenance Responsibility	Inspection Frequency
		Pass	Minor	Moderate	Severe		
BVZ-3	Bed zone erosion, bare patches or sinking	No evidence of erosion or sinking.	Erosion is minor, such as displacing mulch or small bare patches. OR Isolated areas of sinking.	Erosion is considerate, concentrated flows are evident and deep gully formation is occurring in several locations in the facility. OR Evidence of moderate localized sinking, sinking at pre-treatment structure, inlet, outlet, or overflow.	Erosion is severe, concentrated flows are evident and deep gully formation is occurring throughout the facility. OR Severe sinking occurring at any location in facility.	Parks	Semi-annually
	Potential Action Required By Inspector	None	<ul style="list-style-type: none"> Instruct maintenance team to re-distribute and top up mulch or soil media Monitor in future inspections 	<ul style="list-style-type: none"> Instruct maintenance team to re-distribute and top up mulch or soil media Assess bed flow paths for preferential flow path Consider underdrain malfunction or animal activity as source of sinking 	<ul style="list-style-type: none"> Instruct maintenance team to re-distribute and top up mulch or soil media Assess bed flow paths for preferential flow path. Consider if facility and/or inlet are adequately sized for storm events Consider underdrain malfunction or animal activity as source of sinking 		
	Potential Action Required By Maintenance Team	None	Re-distribute and top up mulch and/or soil media	<ul style="list-style-type: none"> Re-distribute and top up mulch or soil media Correct preferential flow path by raking or backfilling, install/repair underdrain in the case of sinking 	<ul style="list-style-type: none"> Re-distribute and top up mulch or soil media. Correct preferential flow path by raking or backfilling Install/repair underdrain in the case of sinking Install additional flow spreaders at inlet or along flow path 		
	Level of Training Required by Maintenance Team	N/A	Low	Medium	High		
BVZ-4	Bed zone sediment accumulation	Facility is free of sediment and caking.	Sediment caking is thin and isolated to inlet.	Sediment caking is thin but affects majority of facility.	Sediment caking is severe, affects majority of facility and is likely reducing facility infiltration.	Parks	Semi-annually
	Potential Action Required By Inspector	None	<ul style="list-style-type: none"> Instruct maintenance team to remove as much as possible and rake in what remains Monitor in future inspections 	<ul style="list-style-type: none"> Instruct maintenance team to remove as much as possible and rake in what remains Assess pre-treatment functionality and capacity 	<ul style="list-style-type: none"> Instruct maintenance team to fully remove top 150 mm of amended soil media and replace Assess pre-treatment functionality and capacity Assess CDA for sediment sources 		
	Potential Action Required By Maintenance Team	None	Remove as much sediment as possible and rake in what remains	<ul style="list-style-type: none"> Remove as much sediment as possible and rake in what remains Clean out pre-treatment device 	<ul style="list-style-type: none"> Remove top 150 mm of amended soil media and replace with approved new batch Clean out pre-treatment device Stabilize CDA and/or remove sources of sediment form CDA 		
	Level of Training Required by Maintenance Team	N/A	Low	Medium	High		

Table 10. Maintenance and Inspection – Master Table for Bioretention, Bioswale, Naturalized Drainage Way and Box Planter Facilities

#	Item	Description of Condition				Maintenance Responsibility	Inspection Frequency
		Pass	Minor	Moderate	Severe		
BVZ-5	Grade control structures	No evidence of structural damage and/or improper function.	Minor structural damage and/or minor deviation from design flow, evidenced by oversaturated or dehydrated conditions.	Moderate structural damage and/or flows deviating from design evidenced by non-distributed storage, dehydrated vegetation or downstream erosion due to higher than expected flows.	Severe structural damage and/or flows completely deviating from design evidenced by non-distributed storage and or facility flooding, extremely dehydrated vegetation or severe downstream erosion due to higher than expected flows.	Drainage	Annually ~ After major storm event
	Potential Action Required By Inspector	None	Mark on inspection form and monitor in future inspections.	<ul style="list-style-type: none"> Evaluate cause of structural damage Instruct maintenance team to repair structural damage, if possible Instruct maintenance team to repair any erosion caused by faulty structure Consider increasing inspection and maintenance frequency 	<ul style="list-style-type: none"> Evaluate cause of structural damage Evaluate cause of flow deviation (weir size or shape) Instruct maintenance team to repair structural damage or replace structure if deteriorated beyond repair; re-establish proper weir size and shape Instruct maintenance team to repair any erosion caused by faulty structure Monitor in future inspections 		
	Potential Action Required By Maintenance Team	None	None	<ul style="list-style-type: none"> Repair grade control structure Repair damage caused by erosion 	<ul style="list-style-type: none"> Repair grade control structure Repair damage caused by erosion 		
	Level of Training Required by Maintenance Team	N/A	N/A	High	High		
BVZ-6	Riprap condition	Riprap is functioning effectively.	Riprap is slightly ineffective. Signs of erosion or soil accumulation, some dislodged or unstable rocks.	Riprap is significantly dislodged or unstable. Moderate erosion or sediment accumulation is occurring.	Riprap is ineffective. Majority of rocks are dislodged or unstable. Significant erosion or sediment accumulation is occurring.	Drainage	Annually ~ After major storm event
	Potential Action Required By Inspector	None	<ul style="list-style-type: none"> Notify maintenance team to repair erosion, remove soil accumulation, replace dislodged rocks, or stabilize unstable sections Monitor in future inspections 	<ul style="list-style-type: none"> Notify maintenance team to repair erosion, remove soil accumulation, replace dislodged rocks, or stabilize unstable sections Evaluate riprap design for effectiveness (riprap coverage, rock size) Evaluate riprap design for effectiveness (riprap coverage, rock size) Monitor in future inspections 	<ul style="list-style-type: none"> Evaluate riprap design for effectiveness (riprap coverage, rock size, rock placement, slope) Evaluate CDA to ensure facility is receiving design flow Evaluate effectiveness of riprap and the need for a new BMP type for erosion protection Notify maintenance team to repair erosion, remove soil accumulation, replace dislodged rocks, or stabilize unstable sections Notify maintenance team to re-grade CDA to match design 		
	Potential Action Required By Inspector	None	<ul style="list-style-type: none"> Repair erosion Remove accumulated soil Replace dislodged rocks Stabilize unstable sections 	<ul style="list-style-type: none"> Repair erosion Remove accumulated soil Replace dislodged rocks Stabilize unstable sections 	<ul style="list-style-type: none"> Repair erosion Remove accumulated soil Re-grade riprap Replace dislodged rocks Remove and replace rock Stabilize unstable sections Re-grade CDA Install new erosion protection BMP 		
	Level of Training Required by Maintenance Team	N/A	Medium	Medium	High		

Table 10. Maintenance and Inspection – Master Table for Bioretention, Bioswale, Naturalized Drainage Way and Box Planter Facilities

#	Item	Description of Condition				Maintenance Responsibility	Inspection Frequency
		Pass	Minor	Moderate	Severe		
BVZ-7	Mulch depth and condition (if specified)	Mulch depth of 75-100mm and ≥80% ground cover.	Less than 75mm depth mulch and <80% groundcover.	More than 100mm of mulch causing blockages. OR Sparse mulch coverage.	More than 150mm of mulch causing major blockages. OR No mulch coverage.	Parks	Semi-annually
	Potential Action Required By Inspector	None	Instruct maintenance team to remedy mulch depth to standard depth	<ul style="list-style-type: none"> Instruct maintenance team to remedy mulch depth to standard depth Investigate reason for mulch discrepancy (e.g. staff not familiar with standard practice) 	<ul style="list-style-type: none"> Instruct maintenance team to remedy mulch depth to standard depth Investigate reason for mulch discrepancy (e.g. staff not familiar with standard practice, facility undersized for storm events) Increase inspection and maintenance frequency 		
	Potential Action Required By Maintenance Team	None	Top up or remove mulch to standard depth and 100% coverage	Top up or remove mulch to standard depth and 100% coverage	Top up or remove mulch to standard depth and 100% coverage		
	Level of Training Required by Maintenance Team	N/A	Low	Low	Low		
BVZ-8	Plant material health	Over 80% plant material thriving.	Over 20% of plant material shows signs of dehydration or disease.	20-60% of plant material shows signs of dehydration or disease.	Over 60% of plant material shows signs of dehydration or disease.	Parks	Semi-annually
	Potential Action Required By Inspector	None	<ul style="list-style-type: none"> Assess for diseased vegetation Assess for signs of dehydration Monitor in future inspections 	<ul style="list-style-type: none"> Assess spread of disease Assess for signs of dehydration If needed, recommend replacement species Instruct maintenance team to re-plant where needed Monitor in future inspections 	<ul style="list-style-type: none"> Assess planting to ensure species are appropriate for facility and disease free Assess for signs of dehydration Assess facility and ensure plant species are receiving the intended amount of water and sunlight. Test amended soil media Create a new planting plan and instruct maintenance team to remove existing species and re-plant 		
	Potential Action Required By Maintenance Team	None	<ul style="list-style-type: none"> Treat diseased vegetation Water where needed 	<ul style="list-style-type: none"> Treat diseased vegetation Water where needed Re-plant as directed 	<ul style="list-style-type: none"> Redesign according to assessment Remove and replant entire facility 		
	Level of Training Required by Maintenance Team	N/A	Medium	Medium	High		

Table 10. Maintenance and Inspection – Master Table for Bioretention, Bioswale, Naturalized Drainage Way and Box Planter Facilities

#	Item	Description of Condition				Maintenance Responsibility	Inspection Frequency
		Pass	Minor	Moderate	Severe		
BVZ-9	Plant material density and coverage	Over 80% vegetative coverage.	Less than 80% coverage (bare patches).	Less than 50% coverage.	Less than 25% coverage.	Parks	Semi-annually
	Potential Action Required By Inspector	None	<ul style="list-style-type: none"> Instruct maintenance team to fill in bare areas (on-site or new plant material) and re-seed bare patches of turf Assess for signs of dehydration Monitor in future inspections 	<ul style="list-style-type: none"> Assess planting to ensure species are appropriate for facility and disease free Assess for signs of dehydration If needed, recommend replacement species Instruct maintenance team to fill in bare areas (on-site or new plant material) and re-seed bare patches of turf Monitor in future inspections 	<ul style="list-style-type: none"> Assess planting to ensure species are appropriate for facility and disease free Assess for signs of dehydration Assess facility and ensure plant species are receiving the intended amount of water and sunlight. Test amended soil media. Create a new planting plan and instruct maintenance team to remove existing species and re-plant 		
	Potential Action Required By Maintenance Team	None	<ul style="list-style-type: none"> Fill in bare areas with either plant material on site or new plantings Water where needed Reseed bare patches of turf 	<ul style="list-style-type: none"> Fill in bare areas with recommended plant material Treat diseased plants, if necessary Water where needed Reseed bare patches of turf 	<ul style="list-style-type: none"> Fill in bare areas with recommended plant material Treat diseased plants, if necessary Water where needed Reseed bare patches of turf Remove and replant entire facility 		
	Level of Training Required by Maintenance Team	N/A	Medium	High	High		
BVZ-10	Landscape aesthetics	Noticeably maintained and meets aesthetics desired.	Plant coverage not as dense as intended.	Plant material is taking over facility OR Facility is sparsely covered.	Plant material has taken over facility OR Facility is bare.	Parks	Semi-annually
	Potential Action Required By Inspector	None	Instruct maintenance crews to plant bare areas	Instruct maintenance crews to plant bare areas OR replace aggressive species with something more suitable for the space	Instruct maintenance crews to plant bare areas OR replace aggressive species with something more suitable for the space		
	Potential Action Required By Maintenance Team	None	Plant bare areas	Plant bare areas or replace species	Plant bare areas or replace species		
	Level of Training Required by Maintenance Team	N/A	Medium	Medium	Medium		
BVZ-11	Weeds and/or invasive species	No weeds are evident.	Weeds are starting to become noticeable.	Weeds are starting to take over.	Less than 25% coverage by desired plant material.	Parks	Semi-annually
	Potential Action Required By Inspector	None	Inform maintenance team weeding is required	<ul style="list-style-type: none"> Assess weeding schedule Inform maintenance team weeding is required Monitor in future inspections 	<ul style="list-style-type: none"> Evaluate surrounding area for source of weed aggression Assess weeding schedule Inform maintenance team weeding is required 		
	Potential Action Required By Maintenance Team	None	Weed where needed	Weed where needed	Weed where needed		
	Level of Training Required by Maintenance Team	N/A	Medium	Medium/High	Medium/High		

Table 10. Maintenance and Inspection – Master Table for Bioretention, Bioswale, Naturalized Drainage Way and Box Planter Facilities

#	Item	Description of Condition				Maintenance Responsibility	Inspection Frequency
		Pass	Minor	Moderate	Severe		
OUTLET ZONE							
OZ-1	Underdrains, clean-outs, overflows	Free of sediment, debris, sags, damage, and cleanout caps present.	Minimal loss of outlet capacity or cleanout caps damaged or not present.	Major loss of outlet capacity.	Outlet or pipe completely blocked, has sagged or is damaged and requiring repair.	Drainage	Annually
	Potential Action Required By Inspector	None	<ul style="list-style-type: none"> Instruct maintenance team to flush or remove debris or replace cap Monitor on next investigation 	<ul style="list-style-type: none"> Instruct maintenance team to flush or remove debris Investigate cause of obstruction 	<ul style="list-style-type: none"> Instruct maintenance team to flush or remove debris Investigate cause of obstruction or damage Recommend pipe replacement 		
	Potential Action Required By Maintenance Team	None	<ul style="list-style-type: none"> Flush pipe Remove debris from overflow Replace cleanout cap 	<ul style="list-style-type: none"> Flush pipe Remove debris from overflow 	<ul style="list-style-type: none"> Flush, repair or replace pipe Remove debris from overflow 		
	Level of Training Required by Maintenance Team	N/A	Medium	Medium	High		
OZ-2	Outlet obstruction	No evidence of obstruction.	Partially blocked but flow can still enter.	Outlet is blocked but still visible.	Outlet is blocked and not visible. Flow cannot enter.	Drainage	Semi-annually ~ After major storm event
	Potential Action Required By Inspector	None	Mark on inspection form and monitor in future inspections	<ul style="list-style-type: none"> Evaluate cause of accumulation Consider increasing maintenance frequency Instruct maintenance team to clear 	<ul style="list-style-type: none"> Evaluate cause of accumulation, such as maintenance frequency or frequent mulch application Instruct maintenance team to clear 		
	Potential Action Required By Maintenance Team	None	Clear debris	Clear debris	Clear debris		
	Level of Training Required by Maintenance Team	N/A	Low	Low	Low		
OZ-3	Outlet structural integrity	Outlet is present and undamaged.	Partially damaged but functional.	Outlet is damaged and requires full repair or replacement.	Outlet is missing and requires replacement.	Drainage	Annually
	Potential Action Required By Inspector	None	Instruct maintenance team to replace outlet	<ul style="list-style-type: none"> Investigate source of damage Instruct maintenance team to replace outlet 	<ul style="list-style-type: none"> Investigate source of damage Instruct maintenance team to replace outlet 		
	Potential Action Required By Maintenance Team	None	Repair or replace outlet	Repair or replace outlet	Replace outlet		
	Level of Training Required by Maintenance Team	N/A	High	High	High		

PERFORMANCE INSPECTION

FACILITY WIDE

PI-1	CDA matches design	Size and shape matches design.	5-10% discrepancy.	10-25% discrepancy.	>25% discrepancy.	Drainage	Annually
	Potential Action Required By Inspector	None	Note and monitor on future inspections	<ul style="list-style-type: none"> Investigate cause of discrepancy Consult design team to ensure facility function is not compromised 	<ul style="list-style-type: none"> Investigate cause of discrepancy Consult design team to ensure facility function is not compromised Recommend adjustments to drainage area or facility size 		
	Potential Action Required By Maintenance Team	None	None	None	Adjust drainage area via re-grading		
	Level of Training Required by Maintenance Team	N/A	N/A	N/A	High		
PI-2	Flow is directed to inlet (not applicable to Naturalized Drainage Way)	Water easily enters facility.	Slight by-pass (25% of flow bypasses).	Moderate by-pass occurring (50% of flow bypasses).	Complete by-pass (100% of flow bypasses).	Drainage	Annually
	Potential Action Required By Inspector	None	Monitor in future inspections	<ul style="list-style-type: none"> Evaluate cause of bypass Instruct maintenance team to correct flow path 	<ul style="list-style-type: none"> Evaluate cause of bypass Instruct maintenance team to correct flow path Modify inlet structure 		
	Potential Action Required By Maintenance Team	None	None	Re-grade drainage area	Re-grade drainage area and/or install new inlet structure		
	Level of Training Required by Maintenance Team	N/A	N/A	High	High		
PI-3	Flow distribution in facility bed	Even distribution.	≥75% of facility receiving flow.	Preferential path with ≤50% of facility receiving flow.	Preferential path with ≤25% of facility receiving flow.	Drainage and Parks	Semi-annually ~ After major storm event
	Potential Action Required By Inspector	None	<ul style="list-style-type: none"> Instruct maintenance team to re-distribute mulch and soil media Monitor in future inspections 	<ul style="list-style-type: none"> Assess cause of preferential path (such as mulch movement) Instruct maintenance team to re-distribute mulch and soil media 	<ul style="list-style-type: none"> Assess cause of preferential path (such as mulch movement) Instruct maintenance team to re-distribute mulch and soil media 		
	Potential Action Required By Maintenance Team	None	Rake mulch to evenly distribute	Remove mulch, re-grade soil media, and replace mulch	Remove mulch, re-grade soil media, and replace mulch		
	Level of Training Required by Maintenance Team	N/A	Low	Medium	Medium		
PI-4	Ponding depth	Ponding depth matches design.	10% discrepancy.	25% discrepancy.	50%+ discrepancy.	Drainage	Semi-annually

Table 10. Maintenance and Inspection – Master Table for Bioretention, Bioswale, Naturalized Drainage Way and Box Planter Facilities

#	Item	Description of Condition				Maintenance Responsibility	Inspection Frequency
		Pass	Minor	Moderate	Severe		
	Potential Action Required By Inspector	None	Note on inspection form and monitor plant health (dehydration or over water)	<ul style="list-style-type: none"> Assess cause of discrepancy (such as mulch depth) Instruct maintenance team to remove/add and re-distribute mulch as needed 	<ul style="list-style-type: none"> Assess cause of discrepancy (such as mulch depth, amended soil settlement, outlet elevation) Instruct maintenance team to correct based on cause of discrepancy 		~ After major storm event
	Potential Action Required By Maintenance Team	None	None	Add or remove mulch and rake	Correct facility depth based on recommendation of inspector		
	Level of Training Required by Maintenance Team	N/A	N/A	Low	Medium		
PI-5	Drawdown time and standing water	No evidence of standing water.	Saturated soils exceeding design drawdown time.	Isolated areas of ponding exceeding design drawdown time.	Facility-wide ponding exceeding design drawdown time.	Drainage and Parks	Semi-annually ~ After major storm event
	Potential Action Required By Inspector	None	Note on inspection form and monitor in future visits	<ul style="list-style-type: none"> Increase inspection frequency Evaluate facility ponding depth and longitudinal slope vs design Take soil sample CCTV weeping tile Notify maintenance to review facility for blockages 	<ul style="list-style-type: none"> Increase inspection frequency Evaluate facility ponding depth vs design Take soil sample Perform infiltration test CCTV underdrain Pump out facility 		
	Potential Action Required By Maintenance Team	None	None	Adjust mulch or soil media as directed by inspector	<ul style="list-style-type: none"> Adjust mulch or soil media as directed by inspector Pump out facility 		
	Level of Training Required by Maintenance Team	N/A	N/A	Low	Medium		

WINTER INSPECTION

FACILITY WIDE

INTRODUCTION	COMPANION RESOURCES	TENDERING & PRE-CONSTRUCTION	CONSTRUCTION	PROJECT ACCEPTANCE	MAINTENANCE	GLOSSARY	REFERENCES	CHECKLISTS
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Table 10. Maintenance and Inspection – Master Table for Bioretention, Bioswale, Naturalized Drainage Way and Box Planter Facilities

#	Item	Description of Condition				Maintenance Responsibility	Inspection Frequency
		Pass	Minor	Moderate	Severe		
WI-1	CDA is free of sediment and grit	No evidence of sediment and grit.	Some isolated areas of sediment and grit.	Noticeable coverage of >50% of drainage area.	Entire drainage area covered by sediment and grit.	Parks or Transportation	Annually - during spring melt
	Potential Action Required By Inspector	None	Inform maintenance team to remove	<ul style="list-style-type: none"> Inform maintenance team to remove Install temporary ESC at facility inlet 	<ul style="list-style-type: none"> Inform maintenance team to remove Install temporary ESC at facility inlet Ensure pre-treatment is clean and at full capacity 		
	Potential Action Required By Maintenance Team	None	Remove sediment and grit	<ul style="list-style-type: none"> Remove sediment and grit Install temporary ESC 	<ul style="list-style-type: none"> Remove sediment and grit Install temporary ESC Clean pre-treatment device 		
	Level of Training Required by Maintenance Team	N/A	Low	Medium	Medium		
WI-2	Facility is not being used as snow storage	No snow is stored on facility.	Snow storage on ≤25% of facility.	Snow storage on ≤50% of facility.	Snow storage on ≥75% of facility.	Drainage or Transportation	After first snow plough ~ Monthly in winter months
	Potential Action Required By Inspector	None	Note on inspection form and discuss with transportation group	<ul style="list-style-type: none"> Evaluate alternate snow storage locations Discuss with transportation group 	<ul style="list-style-type: none"> Evaluate alternate snow storage locations Discuss with transportation group Have snow removed from facility, if alternate location is available and removal will not damage facility 		
	Potential Action Required By Maintenance Team	None	None	Use alternate snow storage location	<ul style="list-style-type: none"> Use alternate snow storage locations Remove snow from facility 		
	Level of Training Required by Maintenance Team	N/A	N/A	Low	Medium		
WI-3	Facility has not been damaged by plows	No plough damage evident.	Isolated minor damage present.	Damage evident throughout facility, to hard infrastructure or plant material.	Major damage is present that needs immediate repair.	Drainage	After first snow plow <i>(if</i>

Table 10. Maintenance and Inspection – Master Table for Bioretention, Bioswale, Naturalized Drainage Way and Box Planter Facilities

#	Item	Description of Condition				Maintenance Responsibility	Inspection Frequency
		Pass	Minor	Moderate	Severe		
WI-4	Potential Action Required By Inspector	None	Note on inspection form and re-inspect in the spring	<ul style="list-style-type: none"> Note on inspection form Have damaged area flagged Re-evaluate in the spring Have repairs performed in the spring Discuss with Transportation 	<ul style="list-style-type: none"> Note on inspection form Re-evaluate in the spring Have damaged material remove and have the area flagged Have repairs performed in the spring Discuss with transportation group 		<i>visible</i> ~ Monthly in winter months <i>(if visible)</i> ~ During spring melt
	Potential Action Required By Maintenance Team	None	None	<ul style="list-style-type: none"> Install high visibility flagging (or approved alternate to bring attention to area) Repairs damage in the spring 	<ul style="list-style-type: none"> Remove damaged material Install high visibility flagging (or approved alternate to bring attention to area) Replace damaged material in the spring 		
	Level of Training Required by Maintenance Team	N/A	N/A	Medium	High		
	Flow route to facility is clear	Water easily enters facility.	Slight by-pass (25% of flow bypasses).	Moderate by-pass occurring (50% of flow bypasses).	Complete by-pass (100% of flow bypasses).	Drainage	During spring melt
	Potential Action Required By Inspector	None	Monitor in future inspections	Instruct maintenance team to correct flow path	Instruct maintenance team to correct flow path		
	Potential Action Required By Maintenance Team	None	None	Create flow path to facility inlet	Create flow path to facility inlet		
	Level of Training Required by Maintenance Team	N/A	N/A	Medium	Medium		

6.6.2 Permeable Pavement

The inspection zones for permeable pavement are described below and shown conceptually on **Figure 8**:

- Contributing Drainage Area (CDA): this is the catchment area for the facility. This may include sidewalks, roads, parking lots, lawns, etc. Critical inspection items in this zone are debris and sources of sediment.
- Surface zone (SZ): this is the entire pavement or paver surface.

In addition to the above inspection zones, overall **facility performance (PI)** and **winter inspection (WI)** are included as additional inspection groups.

An overview of critical maintenance activities, grouped by season, has been provided in **Figure 9**.

For each inspection zone, **Table 11** includes guidance on rating criteria (pass, minor, moderate or severe), inspection activities, potential maintenance actions, maintenance responsibility, inspection frequency and recommended training level for each inspection point.

This information is provided as a reference for **City Inspection and Maintenance Crews**. Therefore, where components or materials are recommended for replacement, the use of City resources applies only to City owned facilities. For private facilities, all maintenance activities and costs are the responsibility of the owner.

During the warranty period, it is the responsibility of **the contractor** to ensure that the maintenance activities outlined here are performed and parties are encouraged to use this document as a guide.

In the field, the information presented herein is intended to be used hand-in-hand with the Maintenance Inspection Checklists provided in **Appendix A** and other typical maintenance inspection logs which may be used by maintenance crews.

Recommended tools and equipment required for maintaining permeable pavement surfaces are as follows:

Tools:

- Hand held bristle broom
- Leaf Blower
- Power Washer

Equipment:

- Ride-on litter vacuum
- Regenerative air sweeper
- True air sweeper

Maintenance activities that should **never** be performed on permeable pavement are as follows:

- Re-sealing surface
- Re-surfacing
- Power washing on high pressure setting
- Applying sand as an anti-skid agent
- Storing grit-laden snow
- Storing mulch or topsoil stockpiles

Winter maintenance tips for maintaining the integrity of the permeable pavement surface are as follows:

- Do not apply sand
- If traction is a concern, use de-icing agent judiciously
- Non-chloride de-icers are recommended on **porous asphalt**. This includes, but is not limited to, calcium magnesium acetate (CMA), potassium acetate (KA) and 97% Anhydrous Sodium Acetate (NAAC) based products (typically, these products are advertised as “salt and chloride free”)
- Sodium chloride or rock salt (NaCl) and calcium chloride (CaCl₂) de-icers are recommended for use on **concrete** (typically, these products are advertised as “safe for concrete”)
- Remove excess de-icer from surface once snow has melted
- Wash the surface in the spring to remove excess de-icer
- Designate snow storage off of pavement surface
- Lift plough blade ½ - 1” off ground when ploughing
- Use rubberized edge on plough blades or plastic shovels
- Mark curb lines in the fall to prevent damage from ploughs

Figure 8. Permeable Pavement Inspection Zones

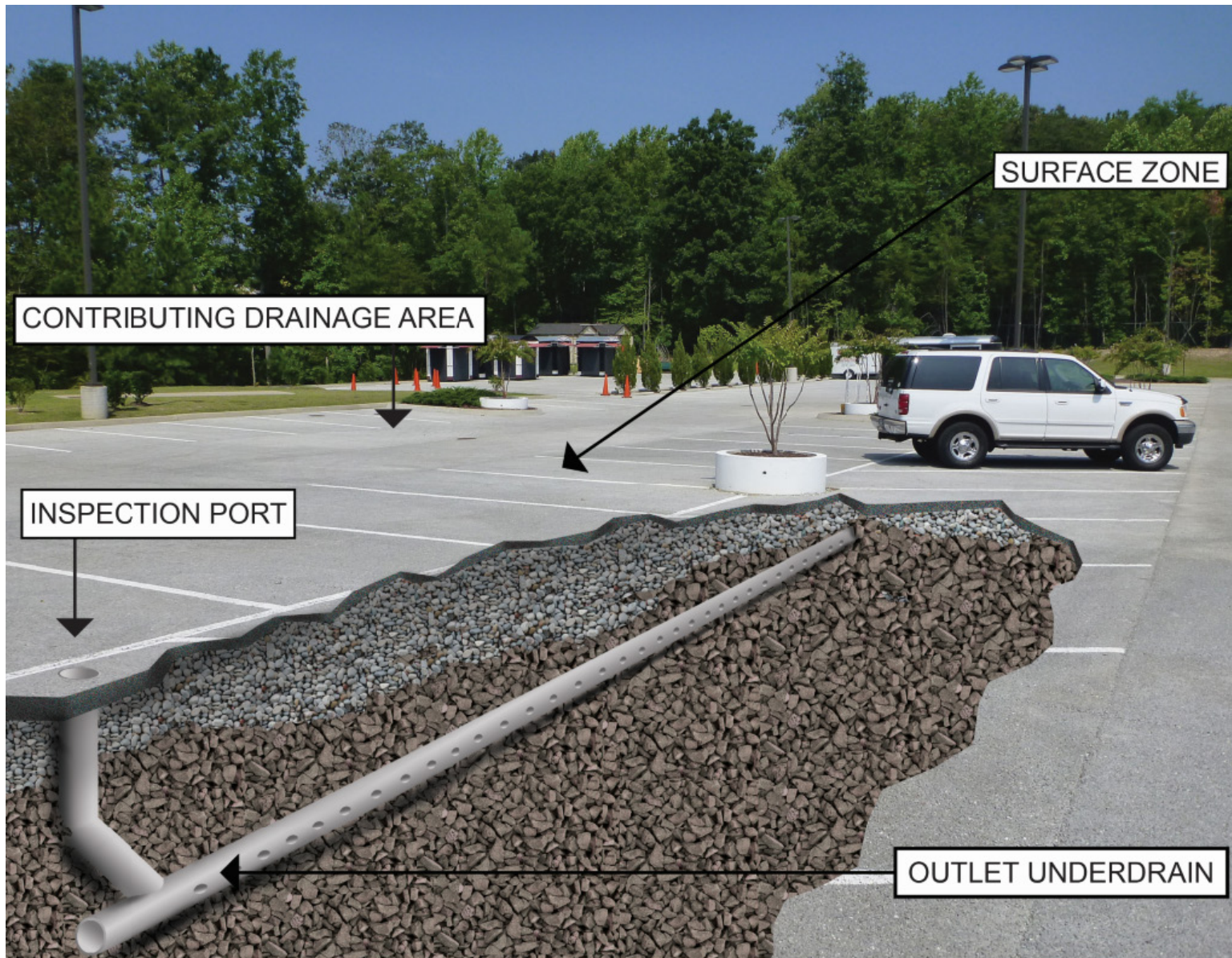


Figure 9. Critical Maintenance Activities by Season

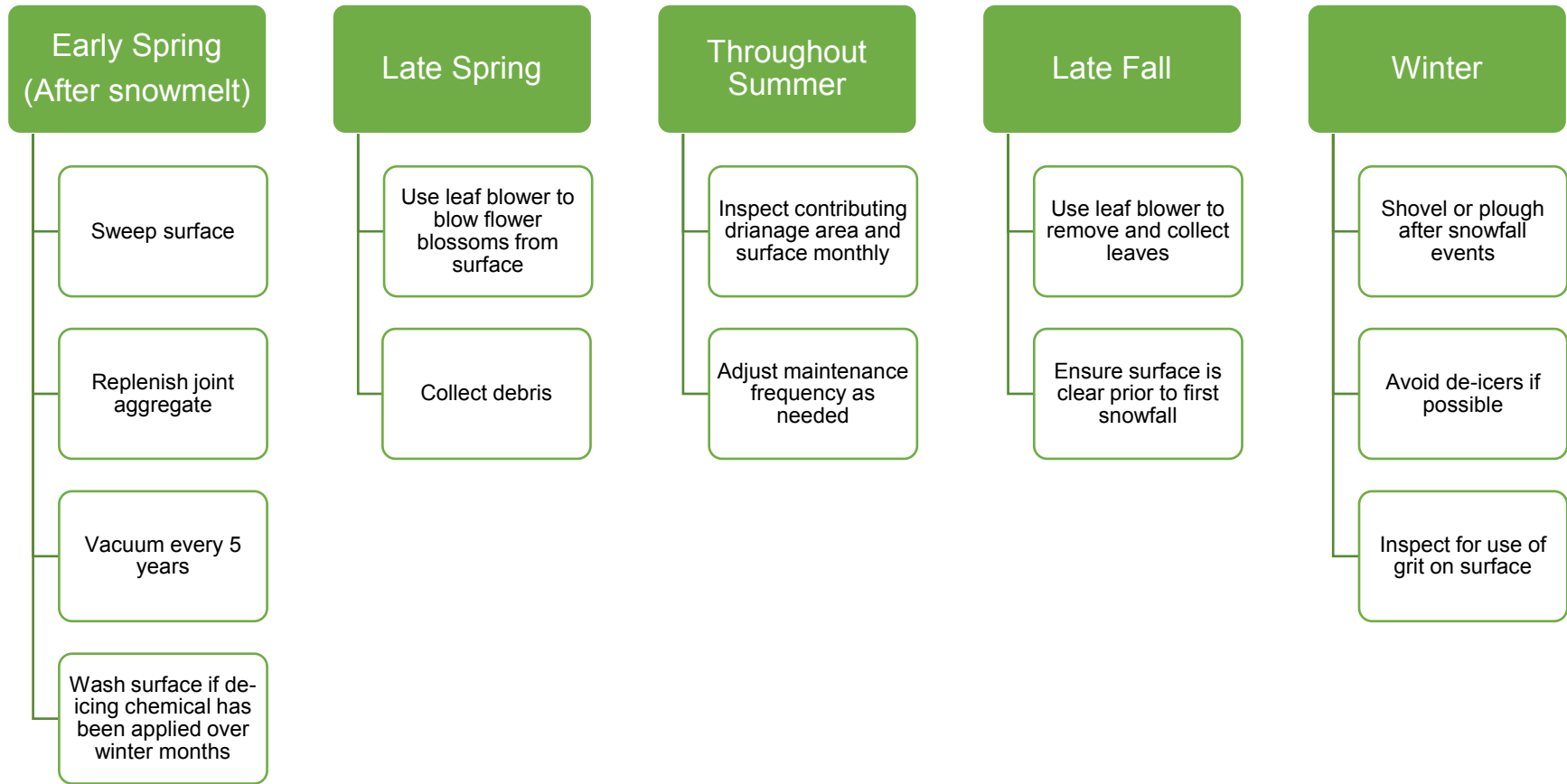


Table 11. Maintenance and Inspection – Master Table for Permeable Pavement Facilities

#	Item	Description of Condition				Maintenance Responsibility	Inspection Frequency
		Pass	Minor	Moderate	Severe		
VISUAL INSPECTION							
CONTRIBUTING DRAINAGE AREA							
CDA-1	Free of debris, trash, leaf fall	No evidence of trash, debris or leaf fall.	Some trash or debris.	Noticeable trash or debris that is affecting facility function.	Trash and debris have negatively impacted or halted facility function.	Parks or Transportation	After spring melt ~ After spring bloom and petal drop ~ End of fall after leaf drop ~ As needed
	Potential Action Required By Inspector	None	Inform maintenance team to have trash removed on next maintenance round in the area	<ul style="list-style-type: none"> Inform maintenance team to have trash immediately removed Evaluate CDA for sources that can be reduced 	<ul style="list-style-type: none"> Inform maintenance team to have trash immediately removed Evaluate CDA for sources that can be reduced Increase inspection and maintenance frequency for area 		
	Potential Action Required By Maintenance Team	N/A	Remove trash and debris	<ul style="list-style-type: none"> Remove trash and debris Empty nearby trash cans Add additional trash cans Clear leaves Prune trees 	<ul style="list-style-type: none"> Remove trash and debris Empty nearby trash cans Add additional trash cans Clear leaves Prune trees 		
	Level of Training Required by Maintenance Team	N/A	Low	Medium	Medium		
CDA-2	No sources of sediment present	No sources of sediment evident in drainage area.	Several bare patches in drainage area.	Considerable amount of drainage area is unstable or contains sediment.	Considerable area of drainage area is unstable or drainage area contains large amount of sediment (e.g. stockpile or winter grit).	Parks or Transportation	Quarterly ~ After spring melt ~ After major storm event
	Potential Action Required By Inspector	None	Inform maintenance team to seed or sod bare patches on next maintenance round	<ul style="list-style-type: none"> Inform maintenance team to immediately remove any sediment in drainage area Instruct maintenance team to stabilize any bare patches 	<ul style="list-style-type: none"> Inform maintenance team to immediately remove any sediment in drainage area Instruct maintenance team to stabilize any bare patches Review facility for sedimentation Review drainage area for sources of erosion 		
	Potential Action Required By Maintenance Team	N/A	Stabilize area on next trip	<ul style="list-style-type: none"> Remove sediment and stabilize area 	<ul style="list-style-type: none"> Remove sediment from drainage area and/or facility Stabilize any bare patches or areas causing erosion 		
	Level of Training Required by Maintenance Team	N/A	Low	Low	Low		

Table 11. Maintenance and Inspection – Master Table for Permeable Pavement Facilities

#	Item	Description of Condition				Maintenance Responsibility	Inspection Frequency
		Pass	Minor	Moderate	Severe		
SURFACE							
S-1	Uneven, missing or damaged pavers <i>(only applicable to permeable unit pavers and open grid pavers)</i>	Smooth, even surface with no missing pavers.	Some uneven sections or isolated areas of missing pavers.	Surface is uneven and acts as a trip hazard or large portions of pavers missing.	Surface is unacceptable to be traveled on or is missing a large section of paver units.	Parks or Transportation (depending on location of facility)	Annually ~ After resident complaint
	Potential Action Required By Inspector	None	<ul style="list-style-type: none"> Assess surface for potential trip hazard Inform maintenance team to replace missing paver(s) 	<ul style="list-style-type: none"> Assess surface for potential trip hazard Inform maintenance team to rectify missing or uneven paver(s) 	<ul style="list-style-type: none"> Assess surface for potential trip hazard Inform maintenance team to rectify missing or uneven paver(s) Assess extent of replacement needed and instruct maintenance team to remove and replace pavers 		
	Potential Action Required By Maintenance Team	N/A	Replace missing paver(s)	<ul style="list-style-type: none"> Remove pavers, re-distribute bedding and re-install pavers (may need to break pavers to remove) Replace missing paver(s) 	<ul style="list-style-type: none"> Remove pavers, re-distribute bedding and re-install pavers (may need to break pavers to remove) Replace missing paver(s) Remove and replace pavers if needed 		
	Level of Training Required by Maintenance Team	N/A	Medium	Medium	Medium		
S-2	Raveling, cracks or potholes <i>(only applicable to porous asphalt and porous concrete)</i>	No signs of pavement degradation.	Slight segregation or small crack in isolated area.	Moderate segregation with some loose aggregate in isolated area OR Widespread minor segregation and cracking (<10% pavement surface).	Severe segregation with some loose aggregate OR Widespread minor segregation and cracking (>10% pavement surface).	Transportation	Annually ~ After resident complaint
	Potential Action Required By Inspector	None	Note blemish in inspection report and monitor in the future	<ul style="list-style-type: none"> Assess total area of degradation Instruct maintenance team to patch 	<ul style="list-style-type: none"> Assess total area of degradation Instruct maintenance team to patch if area of repair will not affect facility function Consider full pavement replacement Investigate cause of failure (poor design or installation, maintenance frequency) 		
	Potential Action Required By Maintenance Team	N/A	None	<ul style="list-style-type: none"> Patch and seal degraded areas with conventional asphalt or concrete mix 	<ul style="list-style-type: none"> Patch and seal degraded areas with conventional asphalt or concrete mix Remove pavement down to bedding or base course and replace 		
	Level of Training Required by Maintenance Team	N/A	N/A	High	High		

Table 11. Maintenance and Inspection – Master Table for Permeable Pavement Facilities

#	Item	Description of Condition				Maintenance Responsibility	Inspection Frequency
		Pass	Minor	Moderate	Severe		
S-3	Debris	No evidence of trash, debris or leaf fall.	Some trash or debris.	Noticeable trash or debris that is affecting facility function.	Trash and debris have negatively impacted or halted facility function.	Parks or Transportation	After spring melt ~ After spring bloom and petal drop ~ End of fall after leaf drop ~ As needed
	Potential Action Required By Inspector	None	Inform maintenance team to have debris removed immediately	<ul style="list-style-type: none"> Inform maintenance team to have debris removed immediately Assess maintenance frequency and/or cause of debris 	<ul style="list-style-type: none"> Inform maintenance team to have trash removed immediately Assess maintenance frequency and/or cause of debris Evaluate CDA for sources that can be reduced 		
	Potential Action Required By Maintenance Team	N/A	Remove trash and debris (may require vacuum operation)	<ul style="list-style-type: none"> Remove trash and debris Empty nearby trash cans Clear leaves 	<ul style="list-style-type: none"> Remove trash and debris Empty nearby trash cans Add additional trash cans Clear leaves Prune trees (high skill) 		
	Level of Training Required by Maintenance Team	N/A	Medium	Medium	Medium* *with the exception of pruning trees which requires high skill		
S-4	Sedimentation	Facility is free of sediment.	Sediment affects <10% of facility area and has not been washed into pavement.	Sediment affects <25% of the facility and/or has been washed into pavement.	Sediment coverage >80%.	Parks or Transportation	After spring melt ~ After spring bloom and petal drop ~ End of fall after leaf drop ~ 2-4 times per year
	Potential Action Required By Inspector	None	<ul style="list-style-type: none"> Instruct maintenance team to vacuum with regenerative air sweeper Discuss importance of keeping mulch and soil off of surface with Parks Monitor in future inspections 	<ul style="list-style-type: none"> Instruct maintenance team to vacuum with regenerative air sweeper and/or power wash with low pressure Discuss importance of keeping mulch and soil off of surface with Parks 	<ul style="list-style-type: none"> Instruct maintenance team to vacuum with true air sweeper and/or power wash with low pressure (joint aggregate will need to be replaced for unit pavers) Discuss importance of keeping mulch and soil off of surface with Parks Assess contributing drainage area for sources 		
	Potential Action Required By Maintenance Team	N/A	Vacuum with regenerative air sweeper	<ul style="list-style-type: none"> Vacuum with regenerative air sweeper Power wash on low pressure setting 	<ul style="list-style-type: none"> Vacuum with true air sweeper Power wash on low pressure setting Replace joint aggregate, if applicable Stabilize contributing drainage area and/or remove sources of sediment 		
	Level of Training Required by Maintenance Team	N/A	Medium	Medium	High		

Table 11. Maintenance and Inspection – Master Table for Permeable Pavement Facilities

#	Item	Description of Condition				Maintenance Responsibility	Inspection Frequency
		Pass	Minor	Moderate	Severe		
S-5	Debris and/or sediment in paver joints <i>(only applicable to permeable unit pavers and open grid pavers)</i>	No sediment or debris present.	<10% of joints have debris or sediment visible.	>50% of joint area has dry non-compacted debris.	>50% of joint area has compacted debris and sediment caking.	Parks or Transportation	After spring melt ~ After spring bloom and petal drop ~ End of fall after leaf drop ~ 2-4 times per year
	Potential Action Required By Inspector	None	<ul style="list-style-type: none"> Instruct maintenance team to vacuum with regenerative air sweeper Discuss importance of keeping mulch and soil off of surface with Parks Monitor in future inspections 	<ul style="list-style-type: none"> Instruct maintenance team to vacuum with regenerative air sweeper and/or power wash with low pressure Discuss importance of keeping mulch and soil off of surface with Parks Assess maintenance frequency 	<ul style="list-style-type: none"> Instruct maintenance team to vacuum with true air sweeper and/or power wash with low pressure and replace joint aggregate Discuss importance of keeping mulch and soil off of surface with Parks Assess contributing drainage area for sources Schedule follow-up inspection after cleaning to assess 		
	Potential Action Required By Maintenance Team	N/A	Vacuum with regenerative air sweeper	<ul style="list-style-type: none"> Vacuum with regenerative air sweeper Power wash on low pressure setting 	<ul style="list-style-type: none"> Vacuum with true air sweeper Power wash on low pressure setting Replace joint aggregate, if applicable Stabilize contributing drainage area and/or remove sources of sediment 		
	Level of Training Required by Maintenance Team	N/A	Medium	Medium	High		
S-6	Joint Aggregate Top-up	Joint aggregate is filled to lip of paver.	N/A	N/A	Joint aggregate has settled below lip of paver.	Parks or Transportation	Annually
	Potential Action Required By Inspector	None	N/A	N/A	Instruct maintenance team to top-up aggregate		
	Potential Action Required By Maintenance Team	N/A	N/A	N/A	Top-up aggregate with aggregate matching design and sweep into joints		
	Level of Training Required by Maintenance Team	N/A	N/A	N/A	Medium		

Table 11. Maintenance and Inspection – Master Table for Permeable Pavement Facilities

#	Item	Description of Condition				Maintenance Responsibility	Inspection Frequency
		Pass	Minor	Moderate	Severe		
S-7	Vegetation coverage <i>(applicable to turf filled unit pavers)</i>	100% coverage.	75% coverage.	50% coverage.	≤25% coverage.	Parks	Annually
	Potential Action Required By Inspector	None	<ul style="list-style-type: none"> Instruct maintenance team to spread seed over bare or sparsely established areas Assess signs of dehydration 	<ul style="list-style-type: none"> Assess soils to ensure they are meeting design/ City standard Inform maintenance team that the entire facility requires an overseed Assess signs of dehydration Monitor in future inspections 	<ul style="list-style-type: none"> Assess soils to ensure they are meeting design/ City standard Assess seed species to ensure they are suitable for the site Implement a new seed type for the facility 		
	Potential Action Required By Maintenance Team	N/A	<ul style="list-style-type: none"> Top dress and seed bare and sparsely established areas Water where needed 	<ul style="list-style-type: none"> Overseed entire facility Water where needed 	Remove and reseed entire facility		
	Level of Training Required by Maintenance Team	N/A	Low	Low	Medium		
S-8	Weeds <i>(applicable to turf filled unit pavers)</i>	No weeds are evident.	Weeds are starting to become noticeable.	Weeds are starting to take over.	Less than 50% turf coverage.	Parks	Semi-annually
	Potential Action Required By Inspector	None	Inform maintenance team weeding is required	<ul style="list-style-type: none"> Assess weeding schedule Inform maintenance team weeding is required Monitor in future inspections 	<ul style="list-style-type: none"> Evaluate surrounding area for source of weed aggression Assess weeding schedule Inform maintenance team weeding is required 		
	Potential Action Required By Maintenance Team	N/A	Weed where needed	Weed where needed	Weed where needed		
	Level of Training Required by Maintenance Team	N/A	Low	Low	Low		

Table 11. Maintenance and Inspection – Master Table for Permeable Pavement Facilities

#	Item	Description of Condition				Maintenance Responsibility	Inspection Frequency
		Pass	Minor	Moderate	Severe		
PERFORMANCE INSPECTION							
PI-1	Standing water and infiltration	No evidence of water on surface or in standpipe 72hrs after a rainfall event.	Localized patches of standing water on <10% of facility surface.	Localized patches of standing water on <25% of facility surface or water present in standpipe 72hrs after rainfall event.	Large area of ponding water on surface or water present in standpipe 72hrs after rainfall event.	Drainage Services	Annually ~ After major storm event
	Potential Action Required By Inspector	None	<ul style="list-style-type: none"> Instruct maintenance team to vacuum with regenerative air sweeper Discuss importance of keeping mulch and soil off of surface with Parks Monitor in future inspections 	<ul style="list-style-type: none"> Instruct maintenance team to vacuum with regenerative air sweeper Discuss importance of keeping mulch and soil off of surface with Parks If ponding is isolated, instruct maintenance team to remove and replace pavers Assess downstream drainage infrastructure for cause of water present in stand pipe 	<ul style="list-style-type: none"> Instruct maintenance team to vacuum with true air sweeper, and replace joint material if dealing with unit pavers Schedule return visit after maintenance and assess if the pavement should be removed and replaced Clean and obtain CCTV footage of underdrain, assess for causes of failure 		
	Potential Action Required By Maintenance Team	N/A	Vacuum with regenerative air sweeper	<ul style="list-style-type: none"> Vacuum with regenerative air sweeper Remove and replace unit pavers and replace joint aggregate Clean downstream drainage infrastructure 	<ul style="list-style-type: none"> Vacuum with true air sweeper (vacuum sweeper) Remove and replace unit pavers and replace joint aggregate Clean downstream drainage infrastructure 		
	Level of Training Required by Maintenance Team	N/A	Medium	Medium	High		

WINTER INSPECTION

FACILITY WIDE

WINTER INSPECTION							
FACILITY WIDE							
WI-1	CDA is free of sediment and grit	No evidence of sediment and grit.	Some isolated areas of sediment and grit.	Noticeable coverage of >50% of drainage area.	Entire drainage area covered by sediment and grit.	Parks or Transportation	Annually - during spring melt
	Potential Action Required By Inspector	None	Inform maintenance team to remove	<ul style="list-style-type: none"> Inform maintenance team to remove Install temporary ESC at facility inlet 	<ul style="list-style-type: none"> Inform maintenance team to remove Install temporary ESC at facility inlet Ensure pre-treatment is clean and at full capacity 		
	Potential Action Required By Maintenance Team	None	Remove sediment and grit	<ul style="list-style-type: none"> Remove sediment and grit Install temporary ESC 	<ul style="list-style-type: none"> Remove sediment and grit Install temporary ESC Clean pre-treatment device 		
	Level of Training Required by Maintenance Team	N/A	Low	Medium	Medium		
WI-2	Facility is not being used as snow storage	No snow is stored on facility.	Snow storage on ≤25% of facility.	Snow storage on ≤50% of facility.	Snow storage on ≥75% of facility.	Drainage or Transportation	After first snow plough ~ Monthly in winter months
	Potential Action Required By Inspector	None	Note on inspection form and discuss with transportation group	<ul style="list-style-type: none"> Evaluate alternate snow storage locations Discuss with transportation group 	<ul style="list-style-type: none"> Evaluate alternate snow storage locations Discuss with transportation group Have snow removed from facility, if alternate location is available and removal will not damage facility 		
	Potential Action Required By Maintenance Team	None	None	Use alternate snow storage location	<ul style="list-style-type: none"> Use alternate snow storage locations Remove snow from facility 		
	Level of Training Required by Maintenance Team	N/A	N/A	Low	Medium		
WI-3	Facility has not been damaged by plows	No plough damage evident.	Isolated minor damage present.	Damage evident throughout facility, to hard infrastructure or plant material.	Major damage is present that needs immediate repair.	Drainage	After first snow plow (if visible)

Table 11. Maintenance and Inspection – Master Table for Permeable Pavement Facilities

#	Item	Description of Condition				Maintenance Responsibility	Inspection Frequency
		Pass	Minor	Moderate	Severe		
	Potential Action Required By Inspector	None	Note on inspection form and re-inspect in the spring	<ul style="list-style-type: none"> Note on inspection form Have damaged area flagged Re-evaluate in the spring Have repairs performed in the spring Discuss with Transportation 	<ul style="list-style-type: none"> Note on inspection form Re-evaluate in the spring Have damaged material remove and have the area flagged Have repairs performed in the spring Discuss with transportation group 		~ Monthly in winter months (<i>if visible</i>) ~ During spring melt
	Potential Action Required By Maintenance Team	None	None	<ul style="list-style-type: none"> Install high visibility flagging (or approved alternate to bring attention to area) Repairs damage in the spring 	<ul style="list-style-type: none"> Remove damaged material Install high visibility flagging (or approved alternate to bring attention to area) Replace damaged material in the spring 		
	Level of Training Required by Maintenance Team	N/A	N/A	Medium	High		

7 GLOSSARY

Best Management Practice – A stormwater control measure or treatment technique used to mitigate changes in runoff quality and quantity triggered by land development or land use changes.

bi-annually – happening every two years

bi-monthly – happening every two months

bioretention – A stormwater management and treatment facility consisting of a shallow depression with amended topsoil and vegetation (also referred to as a rain garden); bioretention facilities are LID measures.

bioswale - A swale with grass and other vegetation, amended topsoil and an underlying infiltration layer use as a stormwater management and treatment facility (also referred to as a vegetated swale); bioswales are LID measures.

BMP – See Best Management Practice

boot compact – to tamp soil by walking on the surface, using body-weight to compact voids

box planter - A bioretention application, often used in an ultra-urban environment, consisting of amended soil, plants and trees encased in a concrete box; box planters are LID measures.

bush-hog – cleaning land of vegetation with a rotary cutter type of mower.

catchment area – the area from which rainfall flows into a receiving water course or water body

CCC – See Construction Completion Certificate

CCTV inspection – See closed circuit television inspection

closed circuit television inspection - A non-destructive visual inspection technique to determine the condition of pipes using remote cameras (also known as pipeline video inspection).

Construction Completion Certificate - A certificate issued by the City of Edmonton signifying the completion of construction; it indicates that the product or facility meets specifications and a holdback amount is released to the contractor.

contractor - In the context of this CIM Guide, the general contractor (main contractor, prime contractor) awarded construction of the project or facility and is responsible for the oversight of the construction site.

contributing basins – See Contributing Drainage Area

contributing drainage area - The area generating runoff which is conveyed via overland flow, channels and/or pipes to the LID or BMP facility.

drainage catchment – See Contributing Drainage Area

Drainage – Refers to the City department that provides sanitary and stormwater drainage services to Edmonton by planning, building, operating, and maintaining pipes, tunnels, pump stations, and stormwater management facilities.

erosion and sediment control – Measures taken to both prevent construction site erosion and promote deposition of mobilized soil particles prior to reaching downstream watercourses and sewer pipes.

ESC – See erosion and sediment control

FAC – See Final Acceptance Certificate

Final Acceptance Certificate – A certificate issued by the City of Edmonton upon expiry of the maintenance period which transfers full responsibility for a municipal improvement from the developer to the City for operation and maintenance.

grade control structures – A structure built within a watercourse, ditch or swale that passes water to a lower elevation while controlling energy and velocity and thus stabilizing the waterway; grade control structures are typically concrete or rock weirs perpendicular to the direction of flow.

in-the-ground – inclusive of at-grade facilities, excludes rainwater harvesting and green roof LID systems

LID – See low impact development

low impact development – A decentralized approach to stormwater management which focuses on managing rainfall at or near where it falls; low impact development facilities are a subset of stormwater best management practices.

major storm event – a rainfall event with precipitation depth exceeding 30mm, or the 2-year 24-hour storm.

Modified Philip-Dunne infiltrometer – A falling head infiltrometer used to measure the saturated hydraulic conductivity of soils.

naturalized drainage way – A surface runoff conveyance feature that uses wetland zones, drop structures and natural materials and vegetation instead of storm sewer mains or to prevent erosion in existing open channel drainage ways; naturalized drainage ways are LID measures.

Owner's Representative – For City projects, either the City project manager or a lead consultant designated by the City. For private projects, typically the lead consultant.

Parks – a term used to encompass all departments and divisions performing plant-related, green and open space inspections and maintenance

perforated pipe – A pipe, typically plastic, containing perforations (holes or slots) along its length used to convey water from beneath a LID facility and limit the formation of saturated soil conditions in the facility when subgrade soils are impermeable (e.g. clay).

permeable pavement – A group of products, including porous asphalt, porous concrete, permeable unit pavers and open grid pavers, which allow stormwater

movement through the surface of the pavement; permeable pavement installations are LID measures.

Primary Approving Authority – the approving authority responsible for sign-off on CCC and FAC.

regenerative air sweeper - uses a controlled blast of air to dislodge debris from the surface

rilling – Formation of narrow, shallow channels in an unprotected slope caused by runoff which is eroding soil (also: rill, rills).

saturated hydraulic conductivity – A measure of the ability of saturated soils to transmit water.

scarification – Process of breaking up and loosening compacted soil to restore infiltration capacity (also: scarify, scarifying).

semi-annually – happening twice in a year

semi-monthly – happening twice in a month

Transportation – Refers to the City department that provides transportation services to Edmonton by planning, building, operating, and maintaining the City road network.

true air sweeper – conventional vacuum suction sweeper

weeping tile – See perforated pipe

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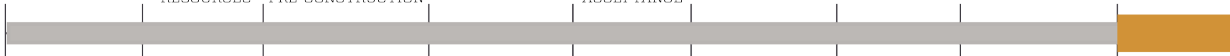
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APPENDIX A CHECKLISTS

Checklists

The Appendix consists of the 27 checklists referenced in the Guide. Each checklist is two pages long, so that it fits on a single piece of paper, if printed double-sided. See main text for further discussion of the use of the checklists. The checklist order is shown in the table below.

#	Facility Type	Checklist
1	Bioretention	Construction Inspection
2		CCC Inspection
3		FAC Inspection
4		Maintenance Inspection
5	Bioswale	Construction Inspection
6		CCC Inspection
7		FAC Inspection
8		Maintenance Inspection
9	Box Planter – Contained	Construction Inspection
10	Box Planter – Flow-through & Infiltration	Construction Inspection
11	Box Planter – Soil Cell	Construction Inspection
12	Box Planter – All types	CCC Inspection
13		FAC Inspection
14		Maintenance Inspection
15	Permeable Pavement – Porous Asphalt	Construction Inspection
16	Permeable Pavement – Porous Concrete	Construction Inspection
17	Permeable Pavement – Permeable Unit Pavers	Construction Inspection
18	Permeable Pavement – Open Grid Pavers	Construction Inspection
19	Permeable Pavement – Porous Asphalt & Porous Concrete	CCC Inspection
20	Permeable Pavement – Permeable Unit Pavers & Open Grid Pavers	CCC Inspection
21	Permeable Pavement – Porous Asphalt & Porous Concrete	FAC Inspection
22	Permeable Pavement – Permeable Unit Pavers & Open Grid Pavers	FAC Inspection
23	Permeable Pavement – All types	Maintenance Inspection
24	Naturalized Drainage Way	Construction Inspection
25		CCC Inspection
26		FAC Inspection
27		Maintenance Inspection



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Bioretention Checklists

INTRODUCTION	COMPANION RESOURCES	TENDERING & PRE-CONSTRUCTION	CONSTRUCTION	PROJECT ACCEPTANCE	MAINTENANCE	GLOSSARY	REFERENCES	CHECKLISTS
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SCARIFICATION *If Specified*

8-1 soils have been scarified correctly (if subgrade has been compacted or design calls for scarification) Notes

ROUGH GRADE

9-1 all elevations (inlets, outlets, overflow, longitudinal slope) match design Notes

GEOTEXTILE *If Specified*

10-1 material is as per specifications Notes

10-2 size of fabric is sufficient for design and to overlap ends

10-3 fabric is free from dust, dirt or mud

10-4 installation meets specification, design location and elevation

UNDERDRAIN AND OVERFLOW DRAIN *If Specified*

11-1 pipe size and material is as per specifications Notes

11-2 pipe is undamaged

11-3 correct and sufficient fittings are on site

11-4 orientation of underdrain perforations and cleanouts matches design

11-5 underdrain pipe is laid to the correct grade

11-6 underdrain pipe is in correct vertical location in trench cross-section

11-7 overflow drain location and orientation is correct

11-8 overflow drain rim elevation matches design

RESERVOIR COURSE AND OTHER AGGREGATE

12-1 rock gradation meets specifications, submittal received and approved Notes

12-2 rocks are rounded

12-3 rock is washed and free from debris

12-4 equipment operating from outside the facility

12-5 installation depth meets specifications

CURBING

13-1 installation meets City of Edmonton construction specification 02770 Notes

13-2 the curb form used matches design

AMENDED SOIL MEDIA, FINISH GRADING AND EROSION CONTROL MATTING

14-1 soil stockpile location is stabilized and not at risk of contamination Notes

14-2 soil test meets specifications and will sustain plant life

14-3 soil installation equipment is operating from outside the facility or a slinger truck is being used

14-4 soil is being placed in 150mm lifts and hydraulically compacted or boot-compacted

14-5 soil depth matches design

14-6 facility bottom is level (if not level, this matches design)

14-7 finish grades match design

14-8 erosion control matting meets specification and submittal received and approved

14-9 erosion control matting has been installed correctly

VEGETATION, MULCH AND WATERING

15-1 plant material and source have been approved prior to installation Notes

15-2 plant material inspected upon delivery and approved prior to installation

15-3 plant material has been installed as per City standards and approved drawings

15-4 water schedule has been submitted and approved

15-5 mulch material meets specification

15-6 mulch has been evenly distributed and installed to the correct depth

15-7 mulch used to achieve finish grade and not blocking inlets or overflows

15-8 vegetation outside of LID facility been installed and site stabilized

Additional Notes

Facility name: _____ **Consultant Name:** _____
Facility location: _____ **Contractor Name:** _____

SOFT LANDSCAPING

Inspector Name: _____ **Date:** _____
Supervisor Name: _____

START OF CCC PROCESS

- L1-1 maintenance and water schedules have been submitted Notes
- L1-2 City inspection has been requested or application for CCC submitted and reviewed

SITE STABILIZATION AND EROSION AND SEDIMENT CONTROL

- L2-1 free of on-site erosion issues Notes
- L2-2 drainage area is not contributing sediment

FACILITY SURFACE

- L3-1 no standing water Notes
- L3-2 no debris (trash or excessive leaf litter)
- L3-3 no sediment accumulation in facility
- L3-4 facility is free of ruts and/ or non-design rocks
- L3-5 no topsoil settlement is visible (adequate depth of soil)

PLANT MATERIAL

- L4-1 trees and shrubs planted as per City standards and approved drawings Notes
- L4-2 size of plant material as per City standards and approved drawings
- L4-3 quantities of trees and shrubs match approved drawings
- L4-4 trees pest free
- L4-5 shrubs pest free
- L4-6 trees and shrubs pruned and free of deadwood
- L4-7 plant material is healthy
- L4-8 plant material has been recently watered
- L4-9 facility is free of weeds and invasive plant species
- L4-10 trees have been planted at appropriate depth
- L4-11 tree baskets have been removed
- L4-12 trees have been staked as per City standards

MULCH

- L5-1 mulch topped up to required depth and stable (not floating/ drifting) Notes
- L5-2 plant beds and mulch rings weed free
- L5-3 mulch is well distributed and uniform
- L5-4 meets design finish grade

SEED AND SOD

- L6-1 seed germination (signs of establishment) Notes
- L6-2 sod knit
- L6-3 turf weed free
- L6-4 meets design finish grade
- L6-5 no damages
- L6-6 healthy

Additional Notes and Follow-up Actions

DRAINAGE PRE-INSPECTION

Inspector Name: _____

Date: _____

Supervisor Name: _____

STARTING THE CCC PROCESS

- D1-1 all material testing results and certifications have been submitted Notes
- D1-2 City inspection has been requested or application for CCC submitted and reviewed
- D1-3 proprietary devices are operational and comply with design

CONCRETE WORK

- D2-1 all concrete is free of damage or cracks Notes
- D2-2 concrete curbs are the proper elevation and location
- D2-3 inlets as specified on drawings
- D2-4 concrete pre-treatment (e.g. settling basin) is the correct size, location and elevation

GRADING

- D3-1 flow from contributing drainage area does not bypass facility Notes
- D3-2 grading within the facility does not short-circuit to the outlet
- D3-3 flow evenly distributes along facility bottom and longitudinal slope matches design
- D3-4 side slopes match the design
- D3-5 inlet, outlet and overflow elevations match the design

UNDERDRAINS

- D4-1 invert elevations have been surveyed and pipe slope matches design Notes
- D4-2 cleanout and/or overflow locations and elevations match design
- D4-3 cleanout caps are accessible and secure
- D4-4 pipe size and material matches design
- D4-5 pipe has been flushed and CCTV video inspected (optional)
- D4-6 CCTV video inspection did not identify issues (optional)

RIPRAP (If Specified)

- D5-1 riprap at required depth and stable Notes
- D5-2 meets appropriate design grade

Additional Notes and Follow-up Actions

DRAINAGE INSPECTION

Inspector Name: _____

Date: _____

Supervisor Name: _____

Notes

- D6-1 facility pre-inspected and any identified deficiencies have been corrected
- D6-2 hardscaping and pre-treatment passed pre-inspection
- D6-3 start-up checklist, sub-contractor orientations and ESC inspections submitted
- D6-4 any documented compaction and/or sedimentation has been remedied
- D6-5 proprietary devices passed pre-inspection
- D6-6 facility grades verified to be within City tolerances
- D6-7 CCTV video inspection did not identify issues (if performed)
- D6-8 no signs of long-term ponding
- D6-9 visual inspections passed
- D6-10 facility is free from deficiencies

Additional Notes and Follow-up Actions

Facility name: _____
 Facility location: _____

Consultant Name: _____
 Contractor Name: _____

SOFT LANDSCAPING

Inspector Name: _____ Date: _____
 Supervisor Name: _____

STARTING THE FAC PROCESS

- L1-1 maintenance logs and water logs have been submitted and reviewed Notes
- L1-2 *Total Capital Asset Form* submitted to the City
- L1-3 FAC application submitted to City and as-built drawings included
- L1-4 pre-inspection of the site has taken place, report submitted and deficiencies fixed
- L1-5 3 copies of FAC application and applicable documentation sent to City

SITE STABILIZATION AND EROSION AND SEDIMENT CONTROL

- L2-1 free of on-site erosion issues Notes
- L2-2 drainage area is not contributing sediment

FACILITY SURFACE

- L3-1 no standing water Notes
- L3-2 no debris (trash or excessive leaf litter)
- L3-3 no sediment accumulation in facility
- L3-4 facility is free of ruts and/ or non-design rocks
- L3-5 no topsoil settlement is visible (adequate depth of soil)

PLANT MATERIAL

- L4-1 trees and shrubs planted as per City standards and approved drawings Notes
- L4-2 size of plant material as per City standards and approved drawings
- L4-3 quantities of trees and shrubs match approved drawings
- L4-4 trees pest free
- L4-5 shrubs pest free
- L4-6 trees and shrubs pruned and free of deadwood
- L4-7 plant material is healthy
- L4-8 plant material has been recently watered
- L4-9 facility is free of invasive plant species
- L4-10 trees have been planted at appropriate depth
- L4-11 tree baskets have been removed
- L4-12 trees have been staked as per City standards

MULCH

- L5-1 mulch topped up to required depth and stable (not floating/ drifting) Notes
- L5-2 plant beds and mulch rings weed free
- L5-3 mulch is well distributed and uniform
- L5-4 meets design finish grade

SEED AND SOD

- L6-1 seed germination (signs of establishment) Notes
- L6-2 sod knit
- L6-3 turf weed free
- L6-4 meets design finish grade
- L6-5 no damages
- L6-6 healthy

Additional Notes and Follow-up Actions

DRAINAGE PRE-INSPECTION

Inspector Name: _____

Date: _____

Supervisor Name: _____

STARTING THE FAC PROCESS

- D1-1 record drawings submitted at least 6 months prior to application Notes
- D1-2 documentation, such as maintenance and service manuals are submitted and reviewed
- D1-3 site has been prepared by contractor for inspection
- D1-4 documentation, have been submitted to the Development

CONCRETE WORK

- D2-1 all concrete is free of damage or cracks Notes
- D2-2 concrete curbs are the proper elevation and location
- D2-3 inlets as specified on drawings
- D2-4 concrete pre-treatment (e.g. settling basin) is the correct size, location and elevation

GRADING

- D3-1 flow from contributing drainage area does not bypass facility Notes
- D3-2 grading within the facility does not short-circuit to the outlet
- D3-3 flow evenly distributes along facility bottom and longitudinal slope matches design
- D3-4 side slopes match the design
- D3-5 inlet, outlet and overflow elevations match the design

UNDERDRAINS

- D4-1 invert elevations have been surveyed and pipe slope matches design Notes
- D4-2 cleanout and/or overflow locations and elevations match design
- D4-3 cleanout caps are accessible and secure
- D4-4 pipe size and material matches design
- D4-5 pipe has been flushed and CCTV video inspected (optional)
- D4-6 CCTV video inspection did not identify issues (optional)

RIPRAP (If Specified)

- D5-1 Riprap at required depth and stable Notes
- D5-2 meets appropriate design grade

Additional Notes and Follow-up Actions

DRAINAGE INSPECTION

Inspector Name: _____

Date: _____

Supervisor Name: _____

Notes

- D6-1 facility pre-inspected and any identified deficiencies have been corrected
- D6-2 CCTV video inspection did not identify issues
- D6-3 visual inspection of facility has been performed and passes
- D6-4 all deficiencies have been cleared in the permitted time period
- D6-5 facility is free from deficiencies

Additional Notes and Follow-up Actions

BIORETENTION	MAINTENANCE INSPECTION CHECKLIST	File No.:
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Facility Name: _____	Date: _____
Facility Location: _____	Current Weather: _____
Inspector Name and Group: _____	
Supervisor Name: _____	Rain in last 24 hours? Yes No How Much? mm

P = Pass; Mi = Minor; Mo = Moderate; S = Severe

VISUAL INSPECTION					
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CONTRIBUTING DRAINAGE AREA	Responsible group: Parks or Transportation
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	P	Mi	Mo	S	Item	<u>Notes</u>
CDA-1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	free of debris, trash, leaf fall	
CDA-2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	no sources of sediment present	

PRE-TREATMENT					
---------------	--	--	--	--	--

	P	Mi	Mo	S	Item	<u>Notes</u>
PT-1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	requiring clean-out	
PT-2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	structural integrity	

INLET					
-------	--	--	--	--	--

	P	Mi	Mo	S	Item	<u>Notes</u>
I-1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	inlet flow capture	
I-2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	inlet obstruction	
I-3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	inlet erosion	
I-4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	inlet structural integrity	

BOUNDARY ZONE					
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	P	Mi	Mo	S	Item	<u>Notes</u>
BZ-1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	facility size matches design	
BZ-2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	boundary debris and/or trash	
BZ-3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	boundary side slope erosion	
BZ-4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	planter box structural integrity	<i>*not applicable to bioretention</i>
BZ-5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	facility enclosure	

BED AND VEGETATED ZONE					
------------------------	--	--	--	--	--

	P	Mi	Mo	S	Item	<u>Notes</u>
BVZ-1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	evidence amended soil does not meet design	
BVZ-2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	bed zone debris and/or trash	
BVZ-3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	bed zone erosion, bare patches or sinking	
BVZ-4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	bed zone sediment accumulation	
BVZ-5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	grade control structures	
BVZ-6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	riprap condition <i>(if specified)</i>	
BVZ-7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	mulch depth and condition <i>(if specified)</i>	
BVZ-8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	plant material health	
BVZ-9	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	plant material density and coverage	
BVZ-10	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	landscape aesthetics	
BVZ-11	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	weeds and/or invasive species	

OUTLET ZONE					
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	P	Mi	Mo	S	Item	<u>Notes</u>
OZ-1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	underdrains, clean-outs, overflows	
OZ-2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	outlet obstruction	
OZ-3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	outlet structural integrity	

PERFORMANCE INSPECTION

Inspect after rainfall events >25mm

FACILITY WIDE

	P	Mi	Mo	S	Item	<u>Notes</u>
PI-1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	CDA matches design	
PI-2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	flow is directed to inlet	
PI-3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	flow distribution in facility bed	
PI-4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	ponding depth	
PI-5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	drawdown time and standing water	

WINTER INSPECTION

Inspect twice over winter months (1) after first snow plough (2) once spring melt begins

FACILITY WIDE

	P	Mi	Mo	S	Item	<u>Notes</u>
WI-1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	CDA is free of sediment and grit	
WI-2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	facility is not being used as snow storage	
WI-3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	facility has not been damaged by plows	
WI-4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	flow route to facility is clear	

Bioswale Checklists

INTRODUCTION	COMPANION RESOURCES	TENDERING & PRE-CONSTRUCTION	CONSTRUCTION	PROJECT ACCEPTANCE	MAINTENANCE	GLOSSARY	REFERENCES	CHECKLISTS
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Facility name: _____	Date: _____
Facility location: _____	Current weather: _____
Inspector name and group: _____	Rain in last 24 hours? Yes No
Supervisor name and group: _____	How Much? mm

PRECONSTRUCTION
GENERAL

- 1-1 meeting set up between the contractor, client and consultant Notes
- 1-2 roles and lines of communication confirmed (sub-contractor orientation plan discussed)
- 1-3 construction process and sequencing have been discussed
- 1-4 construction driving routes have been discussed and will be marked
- 1-5 schedules for construction and routine/non-routine inspections confirmed
- 1-6 importance of ESC discussed and ESC plan and/or proposed location of temporary ESC reviewed
- 1-7 material handling and storage areas discussed
- 1-8 material testing and potential impact on schedule discussed
- 1-9 discuss importance of protecting existing habitat, vegetation, air and water quality

SITE PREPARATION

- 2-1 project boundaries confirmed and marked Notes
- 2-2 all LID facility locations have been identified
- 2-3 driving routes and site access locations have been marked
- 2-4 material storage areas have been identified and won't impact facility
- 2-5 utility locations confirmed and identified
- 2-6 contributing drainage area is stabilized and flow has been diverted (if applicable)
- 2-7 all non-facility impervious cover is installed and equipment has been de-mobilized
- 2-8 soil test conducted (if applicable)

EROSION AND SEDIMENT CONTROL

- 3-1 temporary ESC has been installed correctly and in relevant locations Notes
- 3-2 non-disturbance areas have been protected
- 3-3 emergency ESC items ready and available

OVERWINTER
FACILITY WIDE

- 4-1 winter weather has been considered for construction scheduled adjacent to winter months (October 15 onwards) Notes
- 4-2 site has been sufficiently stabilized prior to October 15
- 4-3 are areas yet to be stripped in the month of October less than 0.4 ha (~1 acre)
- 4-4 previously stripped areas have been stabilized before moving onto new areas
- 4-5 if facility is to be online over winter, the contributing drainage area has been stabilized
- 4-6 soil stabilization (sod, erosion blanket, mulch) has been installed correctly and anchored

CONSTRUCTION
CLEARING AND GRUBBING

- 5-1 vegetation marked for removal is solely within facility footprint or access routes Notes

PRE-TREATMENT

- 6-1 pre-treatment logically placed in the construction sequence? Notes
- 6-2 if landscaped pre-treatment, it is installed in the correct location and elevation
- 6-3 if proprietary device pre-treatment, the model number is correct or an alternative has been approved
- 6-4 if hard armouring pre-treatment, it is installed in the correct location and at the correct elevation

EXCAVATION

- 7-1 excavation is not taking place in wet or saturated conditions Notes
- 7-2 temporary ESC has been checked and is still functioning and properly located
- 7-3 equipment is operating from outside the facility (or has been approved to operate within)
- 7-4 unsuitable material is not stockpiled in a location that could contaminate the facility
- 7-5 salvageable soil has been stockpiled offsite in a location where it will not become contaminated
- 7-6 size and shape of facility matches design (according to survey)
- 7-7 overland flow routes are directed to proper inlet
- 7-8 inlets are not higher than contributing drainage area
- 7-9 no voids due to rocks or roots
- 7-10 no standing water

SCARIFICATION *If Specified*

8-1 soils have been scarified correctly (if subgrade has been compacted or design calls for scarification) [Notes](#)

ROUGH GRADE

9-1 all elevations (inlets, outlets, overflow, longitudinal slope) match design [Notes](#)

GEOTEXTILE *If Specified*

10-1 material is as per specifications [Notes](#)

10-2 size of fabric is sufficient for design and to overlap ends

10-3 fabric is free from dust, dirt or mud

10-4 installation meets specification, design location and elevation

UNDERDRAIN AND OVERFLOW DRAIN *If Specified*

11-1 pipe size and material is as per specifications [Notes](#)

11-2 pipe is undamaged

11-3 correct and sufficient fittings are on site

11-4 orientation of underdrain perforations and cleanouts matches design

11-5 underdrain pipe is laid to the correct grade

11-6 underdrain pipe is in correct vertical location in trench cross-section

11-7 overflow drain location and orientation is correct

11-8 overflow drain rim elevation matches design

RESERVOIR COURSE AND OTHER AGGREGATE

12-1 rock gradation meets specifications, submittal received and approved [Notes](#)

12-2 rocks are rounded

12-3 rock is washed and free from debris

12-4 equipment operating from outside the facility

12-5 installation depth meets specifications

CURBING

13-1 installation meets City of Edmonton construction specification 02770 [Notes](#)

13-2 the curb form used matches design

AMENDED SOIL MEDIA, FINISH GRADING AND EROSION CONTROL MATTING

14-1 soil stockpile location is stabilized and not at risk of contamination [Notes](#)

14-2 soil test meets specifications and will sustain plant life

14-3 soil installation equipment is operating from outside the facility or a slinger truck is being used

14-4 soil is being placed in 150mm lifts and hydraulically compacted or boot-compacted

14-5 soil depth matches design

14-6 facility bottom is level (if not level, this matches design)

14-7 finish grades match design

14-8 erosion control matting meets specification and submittal received and approved

14-9 erosion control matting has been installed correctly

GRADE CONTROL STRUCTURE

15-1 drop structure (grass berm, check dam or equivalent) meets specification [Notes](#)

15-2 equipment operating from outside the facility

15-3 installation height meets specification

RIPRAP

16-1 material is as per specifications [Notes](#)

16-2 material has been installed evenly

16-3 material is installed at the design grade and elevation

VEGETATION, MULCH AND WATERING

17-1 plant material and source have been approved prior to installation [Notes](#)

17-2 plant material inspected upon delivery and approved prior to installation

17-3 plant material has been installed as per City standards and approved drawings

17-4 water schedule has been submitted and approved

17-5 mulch material meets specification

17-6 mulch has been evenly distributed and installed to the correct depth

17-7 mulch used to achieve finish grade and not blocking inlets or overflows

17-8 vegetation outside of LID facility been installed and site stabilized

FENCING *If Specified*

18-1 material is as per specifications [Notes](#)

18-2 installation meets specification, design location and elevation

Additional Notes

Facility Name: _____
Facility Location: _____

Consultant Name: _____
Contractor Name: _____

SOFT LANDSCAPING

Inspector Name _____ **Date:** _____
Supervisor Name: _____

START OF CCC PROCESS

- L1-1** maintenance and water schedules have been submitted Notes
- L1-2** City inspection has been requested or application for CCC submitted and reviewed

SITE STABILIZATION AND EROSION AND SEDIMENT CONTROL

- L2-1** free of on-site erosion issues Notes
- L2-2** drainage area is not contributing sediment

FACILITY SURFACE

- L3-1** no standing water Notes
- L3-2** no debris (trash or excessive leaf litter)
- L3-3** no sediment accumulation in facility
- L3-4** facility is free of ruts and/ or non-design rocks
- L3-5** no topsoil settlement is visible (adequate depth of soil)

PLANT MATERIAL

- L4-1** trees and shrubs planted as per City standards and approved drawings Notes
- L4-2** size of plant material as per City standards and approved drawings
- L4-3** quantities of trees and shrubs match approved drawings
- L4-4** trees pest free
- L4-5** shrubs pest free
- L4-6** trees and shrubs pruned and free of deadwood
- L4-7** plant material is healthy
- L4-8** plant material has been recently watered
- L4-9** facility is free of weeds and invasive plant species
- L4-10** trees have been planted at appropriate depth
- L4-11** tree baskets have been removed
- L4-12** trees have been staked as per City standards

MULCH

- L5-1** mulch topped up to required depth and stable (not floating/ drifting) Notes
- L5-2** plant beds and mulch rings weed free
- L5-3** mulch is well distributed and uniform
- L5-4** meets design finish grade

SEED AND SOD

- L6-1** seed germination (signs of establishment) Notes
- L6-2** sod knit
- L6-3** turf weed free
- L6-4** meets design finish grade
- L6-5** no damages
- L6-6** healthy

Additional Notes and Follow-up Actions

DRAINAGE PRE-INSPECTION

Inspector Name _____
Supervisor Name: _____

Date: _____

STARTING THE CCC PROCESS

- D1-1 all material testing results and certifications have been submitted Notes
- D1-2 City inspection has been requested or application for CCC submitted and reviewed
- D1-3 proprietary devices are operational and comply with design

CONCRETE WORK

- D2-1 all concrete is free of damage or cracks Notes
- D2-2 concrete curbs are the proper elevation and location
- D2-3 inlets as specified on drawings
- D2-4 concrete pre-treatment (e.g. settling basin) is the correct size, location and elevation

GRADING

- D3-1 flow from contributing drainage area does not bypass facility Notes
- D3-2 grading within the facility does not short-circuit to the outlet
- D3-3 flow evenly distributes along facility bottom and longitudinal slope matches design
- D3-4 side slopes match the design
- D3-5 inlet, outlet and overflow elevations match the design

UNDERDRAINS

- D4-1 invert elevations have been surveyed and pipe slope matches design Notes
- D4-2 cleanout and/or overflow locations and elevations match design
- D4-3 cleanout caps are accessible and secure
- D4-4 pipe size and material matches design
- D4-5 pipe has been flushed and CCTV video inspected (optional)
- D4-6 CCTV video inspection did not identify issues (optional)

RIPRAP *If Specified*

- D5-1 riprap at required depth and stable Notes
- D5-2 meets appropriate design grade

Additional Notes and Follow-up Actions

DRAINAGE INSPECTION

Inspector Name _____
Supervisor Name: _____

Date: _____

- D6-1 facility pre-inspected and any identified deficiencies have been corrected Notes
- D6-2 hardscaping and pre-treatment passed pre-inspection
- D6-3 start-up checklist, sub-contractor orientations and ESC inspections submitted
- D6-4 any documented compaction and/or sedimentation has been remedied
- D6-5 proprietary devices passed pre-inspection
- D6-6 facility grades verified to be within City tolerances
- D6-7 CCTV video inspection did not identify issues (if performed)
- D6-8 no signs of long-term ponding
- D6-9 visual inspections passed
- D6-10 facility is free from deficiencies

Additional Notes and Follow-up Actions

Facility Name: _____
Facility Location: _____

Consultant Name: _____
Contractor Name: _____

SOFT LANDSCAPING

Inspector Name _____
Supervisor Name: _____

Date: _____

STARTING THE FAC PROCESS

- L1-1 maintenance logs and water logs have been submitted and reviewed
- L1-2 *Total Capital Asset Form* submitted to the City
- L1-3 FAC application submitted to City and as-built drawings included
- L1-4 pre-inspection of the site has taken place, report submitted and deficiencies fixed
- L1-5 3 copies of FAC application and applicable documentation sent to City

SITE STABILIZATION AND EROSION AND SEDIMENT CONTROL

- L2-1 free of on-site erosion issues Notes
- L2-2 drainage area is not contributing sediment

FACILITY SURFACE

- L3-1 no standing water Notes
- L3-2 no debris (trash or excessive leaf litter)
- L3-3 no sediment accumulation in facility
- L3-4 facility is free of ruts and/ or non-design rocks
- L3-5 no topsoil settlement is visible (adequate depth of soil)

PLANT MATERIAL

- L4-1 trees and shrubs planted as per City standards and approved drawings Notes
- L4-2 size of plant material as per City standards and approved drawings
- L4-3 quantities of trees and shrubs match approved drawings
- L4-4 trees pest free
- L4-5 shrubs pest free
- L4-6 trees and shrubs pruned and free of deadwood
- L4-7 plant material is healthy
- L4-8 plant material has been recently watered
- L4-9 facility is free of invasive plant species
- L4-10 trees have been planted at appropriate depth
- L4-11 tree baskets have been removed
- L4-12 trees have been staked as per City standards

MULCH

- L5-1 mulch topped up to required depth and stable (not floating/ drifting) Notes
- L5-2 plant beds and mulch rings weed free
- L5-3 mulch is well distributed and uniform
- L5-4 meets design finish grade

SEED AND SOD

- L6-1 seed germination (signs of establishment) Notes
- L6-2 sod knit
- L6-3 turf weed free
- L6-4 meets design finish grade
- L6-5 no damages
- L6-6 healthy

Additional Notes and Follow-up Actions

DRAINAGE PRE-INSPECTION

Inspector Name _____
Supervisor Name: _____

Date: _____

STARTING THE FAC PROCESS

Notes

- D1-1 record drawings submitted at least 6 months prior to application
- D1-2 documentation, such as maintenance and service manuals are submitted and reviewed
- D1-3 site has been prepared by contractor for inspection
- D1-4 3 copies of the FAC application, and applicable documentation, have been submitted to the Development Coordination Section

CONCRETE WORK

Notes

- D2-1 all concrete is free of damage or cracks
- D2-2 concrete curbs are the proper elevation and location
- D2-3 inlets as specified on drawings
- D2-4 concrete pre-treatment (e.g. settling basin) is the correct size, location and elevation

GRADING

Notes

- D3-1 flow from contributing drainage area does not bypass facility
- D3-2 grading within the facility does not short-circuit to the outlet
- D3-3 flow evenly distributes along facility bottom and longitudinal slope matches design
- D3-4 side slopes match the design
- D3-5 inlet, outlet and overflow elevations match the design

UNDERDRAINS

Notes

- D4-1 invert elevations have been surveyed and pipe slope matches design
- D4-2 cleanout and/or overflow locations and elevations match design
- D4-3 cleanout caps are accessible and secure
- D4-4 pipe size and material matches design
- D4-5 pipe has been flushed and CCTV video inspected (optional)
- D4-6 CCTV video inspection did not identify issues (optional)

RIPRAP (if specified)

Notes

- D5-1 Riprap at required depth and stable
- D5-2 meets appropriate design grade

Additional Notes and Follow-up Actions

DRAINAGE INSPECTION

Inspector Name _____
Supervisor Name: _____

Date: _____

Notes

- D6-1 facility pre-inspected and any identified deficiencies have been corrected
- D6-2 CCTV video inspection did not identify issues
- D6-3 visual inspection of facility has been performed and passes
- D6-4 all deficiencies have been cleared in the permitted time period
- D6-5 facility is free from deficiencies

Additional Notes and Follow-up Actions

BIOSWALE	MAINTENANCE INSPECTION CHECKLIST	File No.:
-----------------	---	------------------

Facility Name: _____

Date: _____

Facility Location: _____

Current Weather: _____

Inspector Name
and Group: _____

Supervisor Name: _____

Rain in last 24 hours? Yes No
How Much? mm

P = Pass; Mi = Minor; Mo = Moderate; S = Severe

VISUAL INSPECTION

CONTRIBUTING DRAINAGE AREA Responsible group: Parks or Transportation

	P	Mi	Mo	S	Item	<u>Notes</u>
CDA-1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	free of debris, trash, leaf fall	
CDA-2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	no sources of sediment present	

PRE-TREATMENT

	P	Mi	Mo	S	Item	<u>Notes</u>
PT-1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	requiring clean-out	
PT-2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	structural integrity	

INLET

	P	Mi	Mo	S	Item	<u>Notes</u>
I-1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	inlet flow capture	
I-2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	inlet obstruction	
I-3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	inlet erosion	
I-4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	inlet structural integrity	

BOUNDARY ZONE

	P	Mi	Mo	S	Item	<u>Notes</u>
BZ-1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	facility size matches design	
BZ-2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	boundary debris and/or trash	
BZ-3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	boundary side slope erosion	
BZ-4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	planter box structural integrity	<i>*not applicable to bioswale</i>
BZ-5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	facility enclosure	

BED AND VEGETATED ZONE

	P	Mi	Mo	S	Item	<u>Notes</u>
BVZ-1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	evidence amended soil does not meet design	
BVZ-2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	bed zone debris and/or trash	
BVZ-3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	bed zone erosion, bare patches or sinking	
BVZ-4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	bed zone sediment accumulation	
BVZ-5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	grade control structures	
BVZ-6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	riprap condition <i>(if specified)</i>	
BVZ-7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	mulch depth and condition <i>(if specified)</i>	
BVZ-8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	plant material health	
BVZ-9	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	plant material density and coverage	
BVZ-10	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	landscape aesthetics	
BVZ-11	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	weeds and/or invasive species	

OUTLET ZONE

	P	Mi	Mo	S	Item	<u>Notes</u>
OZ-1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	underdrains, clean-outs, overflows	
OZ-2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	outlet obstruction	
OZ-3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	outlet structural integrity	

PERFORMANCE INSPECTION*Inspect after rainfall events >25mm***FACILITY WIDE**

	P	Mi	Mo	S	Item	<u>Notes</u>
PI-1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	CDA matches design	
PI-2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	flow is directed to inlet	
PI-3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	flow distribution in facility bed	
PI-4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	ponding depth	
PI-5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	drawdown time and standing water	

WINTER INSPECTION*Inspect twice over winter months (1) after first snow plough (2) once spring melt begins***FACILITY WIDE**

	P	Mi	Mo	S	Item	<u>Notes</u>
WI-1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	CDA is free of sediment and grit	
WI-2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	facility is not being used as snow storage	
WI-3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	facility has not been damaged by plows	
WI-4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	flow route to facility is clear	

Box Planter Checklists

INTRODUCTION	COMPANION RESOURCES	TENDERING & PRE-CONSTRUCTION	CONSTRUCTION	PROJECT ACCEPTANCE	MAINTENANCE	GLOSSARY	REFERENCES	CHECKLISTS
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Facility name: _____
Facility location: _____
Inspector name and group: _____
Supervisor name and group: _____

Date: _____
Current weather: _____
Rain in last 24 hours? **Yes** **No**
 How Much? **mm**

PRECONSTRUCTION

GENERAL

- 1-1 meeting set up between the contractor, client and consultant Notes
- 1-2 roles and lines of communication confirmed (sub-contractor orientation plan discussed)
- 1-3 construction process and sequencing have been discussed
- 1-4 construction driving routes have been discussed and will be marked
- 1-5 schedules for construction and routine/non-routine inspections confirmed
- 1-6 importance of ESC discussed and ESC plan and/or proposed location of temporary ESC reviewed
- 1-7 material handling and storage areas discussed
- 1-8 material testing and potential impact on schedule discussed
- 1-9 discuss importance of protecting existing habitat, vegetation, air and water quality

SITE PREPARATION

- 2-1 project boundaries confirmed and marked Notes
- 2-2 all LID facility locations have been identified
- 2-3 driving routes and site access locations have been marked
- 2-4 material storage areas have been identified and won't impact facility
- 2-5 utility locations confirmed and identified
- 2-6 contributing drainage area is stabilized and flow has been diverted (if applicable)
- 2-7 all non-facility impervious cover is installed and equipment has been de-mobilized
- 2-8 soil test conducted (if applicable)

EROSION AND SEDIMENT CONTROL

- 3-1 temporary ESC has been installed correctly and in relevant locations Notes
- 3-2 non-disturbance areas have been protected
- 3-3 emergency ESC items ready and available

OVERWINTER

FACILITY WIDE

- 4-1 winter weather has been considered for construction scheduled adjacent to winter months (October 15 onwards) Notes
- 4-2 site has been sufficiently stabilized prior to October 15
- 4-3 are areas yet to be stripped in the month of October less than 0.4 ha (~1 acre)
- 4-4 previously stripped areas have been stabilized before moving onto new areas
- 4-5 if facility is to be online over winter, the contributing drainage area has been stabilized
- 4-6 soil stabilization (sod, erosion blanket, mulch) has been installed correctly and anchored

CONSTRUCTION

CLEARING AND GRUBBING

- 5-1 vegetation marked for removal is solely within facility footprint or access routes Notes

EXCAVATION

- 6-1 excavation is not taking place in wet or saturated conditions Notes
- 6-2 temporary ESC has been checked and is still functioning and properly located
- 6-3 equipment is operating from outside the facility (or has been approved to operate within)
- 6-4 unsuitable material is not stockpiled in a location that could contaminate the facility
- 6-5 salvageable soil has been stockpiled offsite in a location where it will not become contaminated
- 6-6 size and shape of facility matches design (according to survey)
- 6-7 overland flow routes are directed to proper inlet
- 6-8 inlets are not higher than contributing drainage area
- 6-9 no voids due to rocks or roots
- 6-10 no standing water

SUBGRADE PREPARATION

- 7-1 facility bottom elevations match design Notes
- 7-2 subgrade preparation meets specifications

SUB-BASE COURSE AGGREGATE

- 8-1 submittal reviewed and material meets specification Notes
- 8-2 aggregate has been installed as per approved drawings and specifications (depth, compaction)
- 8-3 fine grading has achieved design elevations

UNDERDRAIN AND OVERFLOW DRAIN (if specified)

- 9-1 pipe size and material is as per specifications Notes
- 9-2 pipe is undamaged
- 9-3 correct and sufficient fittings are on site
- 9-4 orientation of underdrain perforations and cleanouts matches design
- 9-5 underdrain pipe is laid to the correct grade
- 9-6 underdrain pipe is in correct vertical location in trench cross-section
- 9-7 overflow drain location and orientation is correct
- 9-8 overflow drain rim elevation matches design

CONCRETE BOX

- 10-1 concrete submittal reviewed and material meets City standard Notes
- 10-2 forms have been inspected and match design
- 10-3 concrete placement matches approved drawings

IMPERMEABLE BARRIER (if specified)

- 11-1 material meets specification Notes
- 11-2 barrier is installed as per approved drawings

RESERVOIR COURSE

- 12-1 rock gradation meets specifications Notes
- 12-2 rock is rounded
- 12-3 rock is washed and free from debris
- 12-4 rock has been installed as per approved drawings

AMENDED SOIL MEDIA AND EROSION CONTROL MEASURES

- 13-1 soil stockpile location is stabilized and not at risk of contamination Notes
- 13-2 soil test meets specifications and will sustain plant life
- 13-3 soil installation equipment is operating from outside the facility or a slinger truck is being used
- 13-4 soil is being placed in 150mm lifts and hydraulically compacted or boot-compacted
- 13-5 soil depth matches design
- 13-6 facility bottom is level (if not level, this matches design)
- 13-7 finish grades match design
- 13-8 erosion control matting or riprap meets specification and submittal received and approved
- 13-9 erosion control matting or riprap has been installed correctly

PERIMETER BACKFILL

- 14-1 backfill is being placed in 150mm lifts Notes
- 14-2 backfill passes compaction testing

BASE COURSE AGGREGATE

- 15-1 rock gradation meets specifications Notes
- 15-2 rock has been installed as per approved drawings

PAVEMENT AND CURBS

- 16-1 curb and pavement installation meets City of Edmonton construction specification 02770 Notes
- 16-2 the curb form used matches design and any curb cuts match specification

VEGETATION, MULCH, WATERING AND TREE GRATE

- 17-1 plant material and source have been approved prior to installation Notes
- 17-2 plant material inspected upon delivery and approved prior to installation
- 17-3 plant material has been installed as per City standards and approved drawings
- 17-4 water schedule has been submitted and approved
- 17-5 mulch material meets specification
- 17-6 mulch has been evenly distributed and installed to the correct depth
- 17-7 mulch used to achieve finish grade and not blocking inlets or overflows
- 17-8 grate meets specification and has been installed correctly

Additional Notes

FLOW THROUGH OR INFILTRATION BOX PLANTER	CONSTRUCTION INSPECTION	File No.:
--	-------------------------	-----------

Facility name: _____ Date: _____
 Facility location: _____ Current weather: _____
 Inspector name and group: _____ Rain in last 24 hours? Yes No
 Supervisor name and group: _____ How Much? mm

PRECONSTRUCTION

- GENERAL**
- 1-1 meeting set up between the contractor, client and consultant Notes
 - 1-2 roles and lines of communication confirmed (sub-contractor orientation plan discussed)
 - 1-3 construction process and sequencing have been discussed
 - 1-4 construction driving routes have been discussed and will be marked
 - 1-5 schedules for construction and routine/non-routine inspections confirmed
 - 1-6 importance of ESC discussed and ESC plan and/or proposed location of temporary ESC reviewed
 - 1-7 material handling and storage areas discussed
 - 1-8 material testing and potential impact on schedule discussed
 - 1-9 discuss importance of protecting existing habitat, vegetation, air and water quality

SITE PREPARATION

- 2-1 project boundaries confirmed and marked Notes
- 2-2 all LID facility locations have been identified
- 2-3 driving routes and site access locations have been marked
- 2-4 material storage areas have been identified and won't impact facility
- 2-5 utility locations confirmed and identified
- 2-6 contributing drainage area is stabilized and flow has been diverted (if applicable)
- 2-7 all non-facility impervious cover is installed and equipment has been de-mobilized
- 2-8 soil test conducted (if applicable)

EROSION AND SEDIMENT CONTROL

- 3-1 temporary ESC has been installed correctly and in relevant locations Notes
- 3-2 non-disturbance areas have been protected
- 3-3 emergency ESC items ready and available

OVERWINTER

- FACILITY WIDE**
- 4-1 winter weather has been considered for construction scheduled adjacent to winter months (October 15 onwards) Notes
 - 4-2 site has been sufficiently stabilized prior to October 15
 - 4-3 are areas yet to be stripped in the month of October less than 0.4 ha (~1 acre)
 - 4-4 previously stripped areas have been stabilized before moving onto new areas
 - 4-5 if facility is to be online over winter, the contributing drainage area has been stabilized
 - 4-6 soil stabilization (sod, erosion blanket, mulch) has been installed correctly and anchored

CONSTRUCTION

CLEARING AND GRUBBING

- 5-1 vegetation marked for removal is solely within facility footprint or access routes Notes

EXCAVATION

- 6-1 excavation is not taking place in wet or saturated conditions Notes
- 6-2 temporary ESC has been checked and is still functioning and properly located
- 6-3 equipment is operating from outside the facility (or has been approved to operate within)
- 6-4 unsuitable material is not stockpiled in a location that could contaminate the facility
- 6-5 salvageable soil has been stockpiled offsite in a location where it will not become contaminated
- 6-6 size and shape of facility matches design (according to survey)
- 6-7 overland flow routes are directed to proper inlet
- 6-8 inlets are not higher than contributing drainage area
- 6-9 no voids due to rocks or roots
- 6-10 no standing water

SUBGRADE PREPARATION

- 7-1 facility bottom elevations match design Notes
- 7-2 subgrade preparation meets specifications

SUB-BASE COURSE AGGREGATE

- 8-1 submittal reviewed and material meets specification Notes
- 8-2 aggregate has been installed as per approved drawings and specifications (depth, compaction)
- 8-3 fine grading has achieved design elevations

UNDERDRAIN AND OVERFLOW DRAIN (if specified)

- 9-1 pipe size and material is as per specifications Notes
- 9-2 pipe is undamaged
- 9-3 correct and sufficient fittings are on site
- 9-4 orientation of underdrain perforations and cleanouts matches design
- 9-5 underdrain pipe is laid to the correct grade
- 9-6 underdrain pipe is in correct vertical location in trench cross-section
- 9-7 overflow drain location and orientation is correct
- 9-8 overflow drain rim elevation matches design

CONCRETE BOX AND INLETS

- 10-1 concrete submittal reviewed and material meets City standard Notes
- 10-2 forms have been inspected and match design
- 10-3 concrete placement matches approved drawings
- 10-4 concrete inlets installed at proper elevation and location

IMPERMEABLE BARRIER

- 11-1 material meets specification Notes
- 11-2 barrier is installed as per approved drawings

RESERVOIR COURSE

- 12-1 rock gradation meets specifications Notes
- 12-2 rock is rounded
- 12-3 rock is washed and free from debris
- 12-4 rock has been installed as per approved drawings

AMENDED SOIL MEDIA AND EROSION CONTROL MEASURES

- 13-1 soil stockpile location is stabilized and not at risk of contamination Notes
- 13-2 soil test meets specifications and will sustain plant life
- 13-3 soil installation equipment is operating from outside the facility or a slinger truck is being used
- 13-4 soil is being placed in 150mm lifts and hydraulically compacted or boot-compacted
- 13-5 soil depth matches design
- 13-6 facility bottom is level (if not level, this matches design)
- 13-7 finish grades match design
- 13-8 erosion control matting or riprap meets specification and submittal received and approved
- 13-9 erosion control matting or riprap has been installed correctly

PERIMETER BACKFILL

- 14-1 backfill is being placed in 150mm lifts Notes
- 14-2 backfill passes compaction testing

BASE COURSE AGGREGATE

- 15-1 rock gradation meets specifications Notes
- 15-2 rock has been installed as per approved drawings

PAVEMENT AND CURBS

- 16-1 curb and pavement installation meets City of Edmonton construction specification 02770 Notes
- 16-2 the curb form used matches design and any curb cuts match specification

VEGETATION, MULCH, WATERING AND TREE GRATE

- 17-1 plant material and source have been approved prior to installation Notes
- 17-2 plant material inspected upon delivery and approved prior to installation
- 17-3 plant material has been installed as per City standards and approved drawings
- 17-4 water schedule has been submitted and approved
- 17-5 mulch material meets specification
- 17-6 mulch has been evenly distributed and installed to the correct depth
- 17-7 mulch used to achieve finish grade and not blocking inlets or overflows
- 17-8 grate meets specification and has been installed correctly

Additional Notes

SOIL CELL PLANTER	CONSTRUCTION INSPECTION	File No.:
-------------------	-------------------------	-----------

Facility name: _____ Date: _____
 Facility location: _____ Current weather: _____
 Inspector name and group: _____ Rain in last 24 hours? Yes No
 Supervisor name and group: _____ How Much? mm

PRECONSTRUCTION

GENERAL

- 1-1 meeting set up between the contractor, client and consultant Notes
- 1-2 roles and lines of communication confirmed (sub-contractor orientation plan discussed)
- 1-3 construction process and sequencing have been discussed
- 1-4 construction driving routes have been discussed and will be marked
- 1-5 schedules for construction and routine/non-routine inspections confirmed
- 1-6 importance of ESC discussed and ESC plan and/or proposed location of temporary ESC reviewed
- 1-7 material handling and storage areas discussed
- 1-8 material testing and potential impact on schedule discussed
- 1-9 discuss importance of protecting existing habitat, vegetation, air and water quality

SITE PREPARATION

- 2-1 project boundaries confirmed and marked Notes
- 2-2 all LID facility locations have been identified
- 2-3 driving routes and site access locations have been marked
- 2-4 material storage areas have been identified and won't impact facility
- 2-5 utility locations confirmed and identified
- 2-6 contributing drainage area is stabilized and flow has been diverted (if applicable)
- 2-7 all non-facility impervious cover is installed and equipment has been de-mobilized
- 2-8 soil test conducted (if applicable)

EROSION AND SEDIMENT CONTROL

- 3-1 temporary ESC has been installed correctly and in relevant locations Notes
- 3-2 non-disturbance areas have been protected
- 3-3 emergency ESC items ready and available

OVERWINTER

FACILITY WIDE

- 4-1 winter weather has been considered for construction scheduled adjacent to winter months (October 15 onwards) Notes
- 4-2 site has been sufficiently stabilized prior to October 15
- 4-3 are areas yet to be stripped in the month of October less than 0.4 ha (~1 acre)
- 4-4 previously stripped areas have been stabilized before moving onto new areas
- 4-5 if facility is to be online over winter, the contributing drainage area has been stabilized
- 4-6 soil stabilization (sod, erosion blanket, mulch) has been installed correctly and anchored

CONSTRUCTION

CLEARING AND GRUBBING

- 5-1 vegetation marked for removal is solely within facility footprint or access routes Notes

EXCAVATION

- 6-1 excavation is not taking place in wet or saturated conditions Notes
- 6-2 temporary ESC has been checked and is still functioning and properly located
- 6-3 equipment is operating from outside the facility (or has been approved to operate within)
- 6-4 unsuitable material is not stockpiled in a location that could contaminate the facility
- 6-5 salvageable soil has been stockpiled offsite in a location where it will not become contaminated
- 6-6 size and shape of facility matches design (according to survey)
- 6-7 overland flow routes are directed to proper inlet
- 6-8 inlets are not higher than contributing drainage area
- 6-9 no voids due to rocks or roots
- 6-10 no standing water

SUBGRADE PREPARATION

- 7-1 facility bottom elevations match design Notes
- 7-2 subgrade preparation meets specifications

GEOTEXTILE

- 8-1 material is as per specifications Notes
- 8-2 size of fabric is sufficient for design and to overlap ends
- 8-3 fabric is free from dust, dirt or mud

SUB-BASE COURSE AGGREGATE

- 9-1 submittal reviewed and material meets specification Notes
- 9-2 aggregate has been installed as per approved drawings and specifications (depth, compaction)
- 9-3 fine grading has achieved design elevations

CELL FRAMES		
10-1	<input type="checkbox"/> material is as per specifications	<u>Notes</u>
10-2	<input type="checkbox"/> tree openings have been located and marked	
10-3	<input type="checkbox"/> a gap has been left between adjacent frames (typically 1-3")	
10-4	<input type="checkbox"/> frames have been anchored as per manufacturers specifications	
10-5	<input type="checkbox"/> frames have been installed as per the manufacturers specifications	
UNDERDRAIN AND OVERFLOW DRAIN (if specified)		
11-1	<input type="checkbox"/> pipe size and material is as per specifications	<u>Notes</u>
11-2	<input type="checkbox"/> pipe is undamaged	
11-3	<input type="checkbox"/> correct and sufficient fittings are on site	
11-4	<input type="checkbox"/> orientation of underdrain perforations and cleanouts matches design	
11-5	<input type="checkbox"/> underdrain pipe is laid to the correct grade	
11-6	<input type="checkbox"/> underdrain pipe is in correct vertical location in trench cross-section	
11-7	<input type="checkbox"/> overflow drain location and orientation is correct	
11-8	<input type="checkbox"/> overflow drain rim elevation matches design	
RESERVOIR COURSE		
12-1	<input type="checkbox"/> rock gradation meets specifications	<u>Notes</u>
12-2	<input type="checkbox"/> rock is rounded	
12-3	<input type="checkbox"/> rock is washed and free from debris	
12-4	<input type="checkbox"/> rock has been installed as per approved drawings	
GEOGRID		
13-1	<input type="checkbox"/> material is as per specifications	<u>Notes</u>
13-2	<input type="checkbox"/> size of sheet is sufficient to enclose full height of frames	
13-3	<input type="checkbox"/> material is free from damage	
13-4	<input type="checkbox"/> sheet has been properly anchored (tip-ties and perimeter uncompacted backfill soil)	
AMENDED SOIL MEDIA		
14-1	<input type="checkbox"/> stockpile location is stabilized and not at risk of contamination	<u>Notes</u>
14-2	<input type="checkbox"/> soil test meets specifications and will sustain plant life	
14-3	<input type="checkbox"/> equipment operating from outside the facility or slinger truck being used	
14-4	<input type="checkbox"/> soil is being placed in 150mm lifts and hydraulically or boot-compacted	
14-5	<input type="checkbox"/> soil depth matches design	
BACKFILL, CELL DECKS and GEOTEXTILE		
15-1	<input type="checkbox"/> approved backfill material has been placed around the perimeter of the cells	<u>Notes</u>
15-2	<input type="checkbox"/> backfill material has been compacted and meets specifications	
15-3	<input type="checkbox"/> an air gap has been left or compost has been installed as per manufacturers specifications	
15-4	<input type="checkbox"/> cell decks have been installed and secured as per manufacturers specifications	
15-5	<input type="checkbox"/> remaining backfill material has been placed and compacted, and meets specifications	
15-6	<input type="checkbox"/> geotextile has been placed over cell decks	
15-7	<input type="checkbox"/> tree opening have been cut in geotextile	
BASE COURSE AGGREGATE		
16-1	<input type="checkbox"/> submittal reviewed and material meets specification	<u>Notes</u>
16-2	<input type="checkbox"/> equipment is operating from outside the facility	
16-3	<input type="checkbox"/> aggregate has been installed as per approved drawings and specifications (lift and total depth, compact	
16-4	<input type="checkbox"/> fine grading has achieved design elevations	
PAVEMENT AND CURBS		
17-1	<input type="checkbox"/> curb and pavement installation meets City of Edmonton construction specification 02770	<u>Notes</u>
17-2	<input type="checkbox"/> the curb form used matches design and any curb cuts match specification	
IMPERMEABLE BARRIER		
18-1	<input type="checkbox"/> material meets specification	<u>Notes</u>
18-2	<input type="checkbox"/> impermeable barrier is installed in the correct locations	
VEGETATION, MULCH, WATERING AND TREE GRATE		
19-1	<input type="checkbox"/> plant material and source have been approved prior to installation	<u>Notes</u>
19-2	<input type="checkbox"/> plant material inspected upon delivery and approved prior to installation	
19-3	<input type="checkbox"/> plant material has been installed as per City standards and approved drawings	
19-4	<input type="checkbox"/> water schedule has been submitted and approved	
19-5	<input type="checkbox"/> mulch material meets specification	
19-6	<input type="checkbox"/> mulch has been evenly distributed and installed to the correct depth	
19-7	<input type="checkbox"/> mulch used to achieve finish grade and not blocking inlets or overflows	
19-8	<input type="checkbox"/> grate meets specification and has been installed correctly	

Additional Notes

Facility Name: _____
Facility Location: _____
Consultant Name: _____
Contractor Name: _____

SOFT LANDSCAPING

Inspector Name _____ **Date:** _____
Supervisor Name: _____

START OF CCC PROCESS

- L1-1** maintenance and water schedules have been submitted
- L1-2** City inspection has been requested or application for CCC submitted and reviewed

SITE STABILIZATION AND EROSION AND SEDIMENT CONTROL

- L2-1** free of on-site erosion issues
- L2-2** drainage area is not contributing sediment

FACILITY SURFACE

- L3-1** no standing water
- L3-2** no debris (trash or excessive leaf litter)
- L3-3** no sediment accumulation in facility
- L3-4** facility is free of ruts and/ or non-design rocks
- L3-5** no topsoil settlement is visible (adequate depth of soil)

PLANT MATERIAL

- L4-1** trees and shrubs planted as per City standards and approved drawings
- L4-2** size of plant material as per City standards and approved drawings
- L4-3** quantities of trees and shrubs match approved drawings
- L4-4** trees pest free
- L4-5** shrubs pest free
- L4-6** trees and shrubs pruned and free of deadwood
- L4-7** plant material is healthy
- L4-8** plant material has been recently watered
- L4-9** facility is free of weeds and invasive plant species
- L4-10** trees have been planted at appropriate depth
- L4-11** tree baskets have been removed
- L4-12** trees have been staked as per City standards

MULCH

- L5-1** mulch topped up to required depth and stable (not floating/ drifting)
- L5-2** plant beds and mulch rings weed free
- L5-3** mulch is well distributed and uniform
- L5-4** meets design finish grade

Additional Notes and Follow-up Actions

DRAINAGE PRE-INSPECTION

Inspector Name _____
Supervisor Name: _____

Date: _____

STARTING THE CCC PROCESS

- D1-1 all material testing results and certifications have been submitted
- D1-2 City inspection has been requested or application for CCC submitted
- D1-3 proprietary devices are operational and comply with design

CONCRETE

- D2-1 all concrete is free of damage or cracks
- D2-2 concrete curbs are the proper elevation and location
- D2-3 inlets as specified on drawings
- D2-4 concrete surfaces have the proper crossfall

GRADING

- D3-1 flow from contributing drainage area does not bypass facility
- D3-2 grading within the facility does not short-circuit to the outlet
- D3-3 flow evenly distributes along facility bottom
- D3-4 inlet, outlet and overflow elevations match the design

UNDERDRAINS (If Specified)

- D4-1 invert elevations have been surveyed and pipe slope matches design
- D4-2 cleanout and/or overflow locations and elevations match design
- D4-3 cleanout caps are accessible and secure
- D4-4 pipe size and material matches design
- D4-5 pipe has been flushed and CCTV video inspected (optional)
- D4-6 CCTV video inspection did not identify issues (optional)

RIPRAP (If Specified)

- D5-1 riprap at required depth and stable
- D5-2 meets appropriate design grade

Additional Notes and Follow-up Actions

DRAINAGE INSPECTION

Inspector Name _____
Supervisor Name: _____

Date: _____

- D6-1 facility pre-inspected and any identified deficiencies have been corrected
- D6-2 hardscaping and pre-treatment passed pre-inspection
- D6-3 start-up checklist, sub-contractor orientations and ESC inspections submitted
- D6-4 any documented compaction and/or sedimentation has been remedied
- D6-5 proprietary devices passed pre-inspection
- D6-6 facility grades verified to be within City tolerances
- D6-7 CCTV video inspection did not identify issues (if performed)
- D6-8 no signs of long-term ponding
- D6-9 visual inspections passed
- D6-10 facility is free from deficiencies

Notes

Additional Notes and Follow-up Actions

Facility Name: _____

Facility Name: _____

SOFT LANDSCAPING

Inspector Name _____

Date: _____

Supervisor Name: _____

STARTING THE FAC PROCESS

Notes

- L1-1 have maintenance logs and water logs have been submitted and reviewed
- L1-2 *Total Capital Asset Form* submitted to the City
- L1-3 FAC application submitted to City and as-built drawings included
- L1-4 pre-inspection of the site has taken place, report submitted and deficiencies fixed
- L1-5 3 copies of FAC application and applicable documentation sent to City

SITE STABILIZATION AND EROSION AND SEDIMENT CONTROL

Notes

- L2-1 free of on-site erosion issues
- L2-2 drainage area is not contributing sediment

FACILITY SURFACE

Notes

- L3-1 no standing water
- L3-2 no debris (trash or excessive leaf litter)
- L3-3 no sediment accumulation in facility
- L3-4 facility is free of ruts and/ or non-design rocks
- L3-5 no topsoil settlement is visible (adequate depth of soil)

PLANT MATERIAL

Notes

- L4-1 trees and shrubs planted as per City standards and approved drawings
- L4-2 size of plant material as per City standards and approved drawings
- L4-3 quantities of trees and shrubs match approved drawings
- L4-4 trees pest free
- L4-5 shrubs pest free
- L4-6 trees and shrubs pruned and free of deadwood
- L4-7 plant material is healthy
- L4-8 plant material has been recently watered
- L4-9 facility is free of invasive plant species
- L4-10 trees have been planted at appropriate depth
- L4-11 tree baskets have been removed
- L4-12 trees have been staked as per City standards

MULCH (If Specified)

Notes

- L5-1 mulch topped up to required depth and stable (not floating/ drifting)
- L5-2 plant beds and mulch rings weed free
- L5-3 mulch is well distributed and uniform
- L5-4 meets design finish grade

Additional Notes and Follow-up Actions

DRAINAGE PRE-INSPECTION

Inspector Name _____

Date: _____

Supervisor Name: _____

STARTING THE FAC PROCESS

Notes

- D1-1 record drawings submitted at least 6 months prior to application
- D1-2 documentation, such as maintenance and service manuals are submitted and reviewed
- D1-3 site has been prepared by contractor for inspection
- D1-4 3 copies of the FAC application, and applicable documentation, have been submitted to the Development Coordination Section

CONCRETE WORK

Notes

- D2-1 all concrete is free of damage or cracks
- D2-2 concrete curbs are the proper elevation and location
- D2-3 inlets as specified on drawings
- D2-4 concrete surfaces have the proper crossfall

GRADING

Notes

- D3-1 flow from contributing drainage area does not bypass facility
- D3-2 grading within the facility does not short-circuit to the outlet
- D3-3 flow evenly distributes along facility bottom
- D3-4 inlet, outlet and overflow elevations match the design

UNDERDRAINS (If Specified)

Notes

- D4-1 invert elevations have been surveyed and pipe slope matches design
- D4-2 cleanout and/or overflow locations and elevations match design
- D4-3 cleanout caps are accessible and secure
- D4-4 pipe size and material matches design
- D4-5 pipe has been flushed and CCTV video inspected (optional)
- D4-6 CCTV video inspection did not identify issues (optional)

RIPRAP (If Specified)

Notes

- D5-1 riprap at required depth and stable
- D5-2 meets appropriate design grade

Additional Notes and Follow-up Actions

DRAINAGE INSPECTION

Inspector Name _____

Date: _____

Supervisor Name: _____

Notes

- D6-1 facility pre-inspected and any identified deficiencies have been corrected
- D6-2 CCTV video inspection did not identify issues
- D6-3 visual inspection of facility has been performed and passes
- D6-4 all deficiencies have been cleared in the permitted time period
- D6-5 facility is free from deficiencies

Additional Notes and Follow-up Actions

BOX PLANTER	MAINTENANCE INSPECTION CHECKLIST	File No.:
--------------------	---	------------------

Facility Name: _____

Date: _____

Facility Location: _____

Current Weather: _____

Inspector Name
and Group: _____

Supervisor Name: _____

Rain in last 24 hours? Yes No
How Much? mm

P = Pass; Mi = Minor; Mo = Moderate; S = Severe

VISUAL INSPECTION

CONTRIBUTING DRAINAGE AREA

Responsible group: Parks or Transportation

	P	Mi	Mo	S	Item	<u>Notes</u>
CDA-1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	free of debris, trash, leaf fall	
CDA-2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	no sources of sediment present	

PRE-TREATMENT

	P	Mi	Mo	S	Item	<u>Notes</u>
PT-1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	requiring clean-out	
PT-2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	structural integrity	

INLET

	P	Mi	Mo	S	Item	<u>Notes</u>
I-1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	inlet flow capture	
I-2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	inlet obstruction	
I-3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	inlet erosion	
I-4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	inlet structural integrity	

BOUNDARY ZONE

	P	Mi	Mo	S	Item	<u>Notes</u>
BZ-1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	facility size matches design	
BZ-2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	boundary debris and/or trash	<i>*not applicable to box planter</i>
BZ-3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	boundary side slope erosion	<i>*not applicable to box planter</i>
BZ-4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	planter box structural integrity	
BZ-5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	facility enclosure	

BED AND VEGETATED ZONE

	P	Mi	Mo	S	Item	<u>Notes</u>
BVZ-1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	evidence amended soil does not meet design	
BVZ-2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	bed zone debris and/or trash	
BVZ-3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	bed zone erosion, bare patches or sinking	
BVZ-4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	bed zone sediment accumulation	
BVZ-5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	grade control structures	
BVZ-6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	riprap condition <i>(if specified)</i>	
BVZ-7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	mulch depth and condition <i>(if specified)</i>	
BVZ-8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	plant material health	
BVZ-9	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	plant material density and coverage	
BVZ-10	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	landscape aesthetics	
BVZ-11	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	weeds and/or invasive species	

OUTLET ZONE

	P	Mi	Mo	S	Item	<u>Notes</u>
OZ-1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	underdrains, clean-outs, overflows	
OZ-2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	outlet obstruction	
OZ-3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	outlet structural integrity	

PERFORMANCE INSPECTION*Inspect after rainfall events >25mm***FACILITY WIDE**

	P	Mi	Mo	S	Item	<u>Notes</u>
PI-1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	CDA matches design	
PI-2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	flow is directed to inlet	
PI-3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	flow distribution in facility bed	
PI-4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	ponding depth	
PI-5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	drawdown time and standing water	

WINTER INSPECTION*Inspect twice over winter months (1) after first snow plough (2) once spring melt begins***FACILITY WIDE**

	P	Mi	Mo	S	Item	<u>Notes</u>
WI-1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	CDA is free of sediment and grit	
WI-2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	facility is not being used as snow storage	
WI-3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	facility has not been damaged by plows	
WI-4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	flow route to facility is clear	

Permeable Pavement Checklists

INTRODUCTION	COMPANION RESOURCES	TENDERING & PRE-CONSTRUCTION	CONSTRUCTION	PROJECT ACCEPTANCE	MAINTENANCE	GLOSSARY	REFERENCES	CHECKLISTS
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CONSTRUCTION

CLEARING AND GRUBBING

- 5-1 vegetation marked for removal is solely within facility footprint or access routes [Notes](#)

EXCAVATION

- 6-1 excavation is not taking place in wet or saturated conditions [Notes](#)
- 6-2 temporary ESC has been checked and is still functioning and properly located
- 6-3 equipment is operating from outside the facility (or has been approved to operate within)
- 6-4 material stockpiles are away from the facility and protected from run-on, run-off and wind erosion
- 6-5 size and shape of facility matches design (according to survey)
- 6-6 rocks and roots are removed
- 6-7 no standing water or groundwater present
- 6-8 all elevations conform with plan

GEOTEXTILE AND IMPERMEABLE LINERS

- 7-1 material meets design specifications [Notes](#)
- 7-2 size of fabric is sufficient for design and to overlap ends
- 7-3 material is free from dust, dirt or mud
- 7-4 material is free from holes or tears
- 7-5 material is laid and pulled taught, no wrinkles present
- 7-6 impermeable liners only: placement, field welding and seals conform with design specifications

UNDERDRAIN

- 8-1 pipe size and material is as per specifications [Notes](#)
- 8-2 pipe is undamaged
- 8-3 correct and sufficient fittings are on site
- 8-4 orientation of underdrain perforations and cleanouts matches design
- 8-5 pipe is laid to the correct grade
- 8-6 pipe is in correct vertical location in trench cross-section

AGGREGATES

- 9-1 rock gradation meets specifications and submittal received [Notes](#)
- 9-2 storage is on a hard surface or a geotextile
- 9-3 rocks is washed and free from debris
- 9-4 aggregate is being spread with a front-end loader (not dumped)
- 9-5 installation thickness, placement, compaction and surface tolerances meet specifications

PAVEMENT INSTALLATION

- 10-1 Minimum air temperature is 10°C [Notes](#)
- 10-2 Laying temperature is between 110°C and 127°C (230°F and 260°F)
- 10-3 Asphalt is being placed in a single lift
- 10-4 Compaction is taking place with a 10-ton roller immediately after mixture is spread, struck off, and adjusted
- 10-5 Compaction has not exceeded more than one or two passes
- 10-6 Compaction has not taken place after the mix has cooled below 79°C
- 10-7 In areas not accessible by rollers, compaction has taken place with hot or lightly oiled hand or mechanical tampers
- 10-8 When spreading is interrupted, a joint is constructed and coated with emulsified asphalt prior to resuming
- 10-9 The finished surface is even and has a uniform texture
- 10-10 No traffic has been allowed on the surface until it has cooled below 38°C

[Additional Notes](#)

POROUS CONCRETE	CONSTRUCTION INSPECTION	File No.:
Facility name:	_____	Date:
Facility location:	_____	Current weather:
Inspector name and group:	_____	Rain in last 24 hours?
Supervisor name and group:	_____	Yes No
		How Much? n

MATERIAL SUBMITTALS

- | | | |
|------------|--|--------------|
| | | <u>Notes</u> |
| 1-1 | <input type="checkbox"/> Sub-base reservoir gradation, maximum wash loss, minimum durability index, maximum abrasion loss, air voids | |
| 1-2 | <input type="checkbox"/> Base course gradation, maximum wash loss, minimum durability index, maximum abrasion loss, air voids | |
| 1-3 | <input type="checkbox"/> Filter course or bedding material gradation, permeability and saturated hydraulic conductivity | |
| 1-4 | <input type="checkbox"/> Geotextile manufacturer's certification, apparent and equivalent opening size, tensile strength | |
| 1-5 | <input type="checkbox"/> concrete dispatch slips (water content, mix proportions and admixture) | |

**PRECONSTRUCTION
GENERAL**

- | | | |
|------------|---|--------------|
| | | <u>Notes</u> |
| 2-1 | <input type="checkbox"/> meeting set up between the contractor, client and consultant | |
| 2-2 | <input type="checkbox"/> roles and lines of communication confirmed (sub-contractor orientation plan discussed) | |
| 2-3 | <input type="checkbox"/> construction process and sequencing have been discussed | |
| 2-4 | <input type="checkbox"/> construction driving routes have been discussed and will be marked | |
| 2-5 | <input type="checkbox"/> schedules for construction and routine/nonroutine inspections confirmed | |
| 2-6 | <input type="checkbox"/> discuss importance of ESC and review ESC plan or proposed location of temporary ESC | |
| 2-7 | <input type="checkbox"/> discuss material handling and storage areas | |
| 2-8 | <input type="checkbox"/> discuss material testing and potential impact on schedule | |

SITE PREPARATION

- | | | |
|------------|--|--------------|
| | | <u>Notes</u> |
| 3-1 | <input type="checkbox"/> project boundaries confirmed and marked | |
| 3-2 | <input type="checkbox"/> all LID facility locations have been identified | |
| 3-3 | <input type="checkbox"/> driving routes and site access locations have been marked | |
| 3-4 | <input type="checkbox"/> material storage areas have been identified and won't impact facility | |
| 3-5 | <input type="checkbox"/> utility locations confirmed and identified | |
| 3-6 | <input type="checkbox"/> contributing drainage area is stabilized and flow has been diverted (if applicable) | |
| 3-7 | <input type="checkbox"/> soil test conducted (if applicable) | |

EROSION AND SEDIMENT CONTROL

- | | | |
|------------|---|--------------|
| | | <u>Notes</u> |
| 4-1 | <input type="checkbox"/> temporary ESC has been installed correctly and in relevant locations | |
| 4-2 | <input type="checkbox"/> non-disturbance areas have been protected | |
| 4-3 | <input type="checkbox"/> emergency ESC items ready and available | |

**CONSTRUCTION
CLEARING AND GRUBBING**

- | | | |
|------------|---|--------------|
| | | <u>Notes</u> |
| 5-1 | <input type="checkbox"/> vegetation marked for removal is solely within facility footprint or access routes | |

EXCAVATION

- | | | |
|------------|---|--------------|
| | | <u>Notes</u> |
| 6-1 | <input type="checkbox"/> excavation is not taking place in wet or saturated conditions | |
| 6-2 | <input type="checkbox"/> temporary ESC has been checked and is still functioning and properly located | |
| 6-3 | <input type="checkbox"/> equipment is operating from outside the facility (or has been approved to operate within) | |
| 6-4 | <input type="checkbox"/> material stockpiles are away from the facility and protected from run-on, run-off and wind erosion | |
| 6-5 | <input type="checkbox"/> size and shape of facility matches design (according to survey) | |
| 6-6 | <input type="checkbox"/> rocks and roots are removed | |
| 6-7 | <input type="checkbox"/> no standing water or groundwater present | |
| 6-8 | <input type="checkbox"/> all elevations conform with plan | |

GEOTEXTILE AND IMPERMEABLE LINERS

Notes

- 7-1 material meets design specifications
- 7-2 size of fabric is sufficient for design and to overlap ends
- 7-3 material is free from dust, dirt or mud
- 7-4 material is free from holes or tears
- 7-5 material is laid and pulled taught, no wrinkles present
- 7-6 impermeable liners only: placement, field welding and seals conform with design specifications

UNDERDRAIN

Notes

- 8-1 pipe size and material is as per specifications
- 8-2 pipe is undamaged
- 8-3 correct and sufficient fittings are on site
- 8-4 orientation of underdrain perforations and cleanouts matches design
- 8-5 pipe is laid to the correct grade
- 8-6 pipe is in correct vertical location in trench cross-section

AGGREGATES

Notes

- 9-1 rock gradation meets specifications and submittal received
- 9-2 storage is on a hard surface or a geotextile
- 9-3 rocks is washed and free from debris
- 9-4 aggregate is being spread with a front-end loader (not dumped)
- 9-5 installation thickness, placement, compaction and surface tolerances meet specifications

INSTALLATION INSPECTION

Notes

- 10-1 ambient temperature and wind are acceptable
- 10-2 forms are in place and have been checked for accuracy
- 10-3 concrete truck is not waiting and it being used immediately upon arrival
- 10-4 base course has been pre-wet to surface saturated dry
- 10-5 crew is not walking on concrete mix during placement
- 10-6 crew is not overworking concrete mix during placement
- 10-7 concrete tested using 'ball-in-hand' method (thick paste, ball holds together, material has a sheen, not sloppy, not too dry)
- 10-8 hydraulic roller screed has a wave of material in front of it to prevent the formation of divots
- 10-9 final consolidation is being performed by hand rollers and tampers
- 10-10 joints were constructed immediately after final consolidation
- 10-11 the concrete has been covered with anchored plastic sheeting within 20 min of strike off

Additional Notes

PERMEABLE UNIT PAVERS	CONSTRUCTION INSPECTION	File No.:
------------------------------	--------------------------------	------------------

Facility name: _____	Date: _____
Facility location: _____	Current weather: _____
Inspector name and group: _____	Rain in last 24 hours? Yes No
Supervisor name and group: _____	How Much? mm

MATERIAL SUBMITTALS

Notes

- 1-1 Sub-base reservoir gradation, maximum wash loss, minimum durability index, maximum abrasion loss, air voids
- 1-2 Base course gradation, maximum wash loss, minimum durability index, maximum abrasion loss, air voids
- 1-3 Filter course or bedding material gradation, permeability and saturated hydraulic conductivity
- 1-4 Geotextile manufacturer's certification, apparent and equivalent opening size, tensile strength

**PRECONSTRUCTION
GENERAL**

Notes

- 2-1 meeting set up between the contractor, client and consultant
- 2-2 roles and lines of communication confirmed (sub-contractor orientation plan discussed)
- 2-3 construction process and sequencing have been discussed
- 2-4 construction driving routes have been discussed and will be marked
- 2-5 schedules for construction and routine/nonroutine inspections confirmed
- 2-6 discuss importance of ESC and review ESC plan or proposed location of temporary ESC
- 2-7 discuss material handling and storage areas
- 2-8 discuss material testing and potential impact on schedule

SITE PREPARATION

Notes

- 3-1 project boundaries confirmed and marked
- 3-2 all LID facility locations have been identified
- 3-3 driving routes and site access locations have been marked
- 3-4 material storage areas have been identified and won't impact facility
- 3-5 utility locations confirmed and identified
- 3-6 contributing drainage area is stabilized and flow has been diverted (if applicable)
- 3-7 soil test conducted (if applicable)

EROSION AND SEDIMENT CONTROL

Notes

- 4-1 temporary ESC has been installed correctly and in relevant locations
- 4-2 non-disturbance areas have been protected
- 4-3 emergency ESC items ready and available

**CONSTRUCTION
CLEARING AND GRUBBING**

Notes

- 5-1 vegetation marked for removal is solely within facility footprint or access routes

EXCAVATION

Notes

- 6-1 excavation is not taking place in wet or saturated conditions
- 6-2 temporary ESC has been checked and is still functioning and properly located
- 6-3 equipment is operating from outside the facility (or has been approved to operate within)
- 6-4 material stockpiles are away from the facility and protected from run-on, run-off and wind erosion
- 6-5 size and shape of facility matches design (according to survey)
- 6-6 rocks and roots are removed
- 6-7 no standing water or groundwater present
- 6-8 all elevations conform with plan

GEOTEXTILE AND IMPERMEABLE LINERS

Notes

- 7-1 material meets design specifications
- 7-2 size of fabric is sufficient for design and to overlap ends
- 7-3 material is free from dust, dirt or mud
- 7-4 material is free from holes or tears
- 7-5 material is laid and pulled taught, no wrinkles present
- 7-6 impermeable liners only: placement, field welding and seals conform with design specifications

UNDERDRAIN

Notes

- 8-1 pipe size and material is as per specifications
- 8-2 pipe is undamaged
- 8-3 correct and sufficient fittings are on site
- 8-4 orientation of underdrain perforations and cleanouts matches design
- 8-5 pipe is laid to the correct grade
- 8-6 pipe is in correct vertical location in trench cross-section

AGGREGATES AND EDGING

Notes

- 9-1 rock gradation meets specifications
- 9-2 storage is on a hard surface or a geotextile
- 9-3 rocks is washed and free from debris
- 9-4 aggregate is being spread with a front-end loader (not dumped)
- 9-5 subbase has been moistened to facilitate base material movement into reservoir course
- 9-6 edge restraints are in place before base layer installation, and conform to design
- 9-7 bedding course has been placed and screeded
- 9-8 installation thickness, placement, compaction and surface tolerances meet specifications for all layers

INSTALLATION INSPECTION

Notes

- 10-1 installation is not being performed in rain or snow
- 10-2 during placement, any damaged or missing pavers are replaced before joint aggregate installation
- 10-3 pavers are cut away from the pavement and/or pavement is protected from sediment
- 10-4 joint aggregate matches design and is clean
- 10-5 joint aggregate has been swept into joints and cleaned prior to compaction
- 10-6 pavers are being seated with a low-amplitude 5,000 lbf (22-kN) plate compactor at 75 to 95 Hz
- 10-7 if continuing work the next day, compaction is to within 1.8m of the laying face for the next day

Additional Notes

Facility name: _____

Date: _____

Facility location: _____

Current weather: _____

Inspector name and group: _____

Rain in last 24 hours? Yes No

Supervisor name and group: _____

How Much? mm

MATERIAL SUBMITTALS

- 1-1 sub-base reservoir gradation, maximum wash loss, minimum durability index, maximum abrasion loss, air voids Notes
- 1-2 base course gradation, maximum wash loss, minimum durability index, maximum abrasion loss, air voids
- 1-3 filter course or bedding material gradation, permeability and saturated hydraulic conductivity
- 1-4 geotextile manufacturer's certification, apparent and equivalent opening size, tensile strength

PRECONSTRUCTION GENERAL

- 2-1 meeting set up between the contractor, client and consultant Notes
- 2-2 roles and lines of communication confirmed (sub-contractor orientation plan discussed)
- 2-3 construction process and sequencing have been discussed
- 2-4 construction driving routes have been discussed and will be marked
- 2-5 schedules for construction and routine/nonroutine inspections confirmed
- 2-6 discuss importance of ESC and review ESC plan or proposed location of temporary ESC
- 2-7 discuss material handling and storage areas
- 2-8 discuss material testing and potential impact on schedule

SITE PREPARATION

- 3-1 project boundaries confirmed and marked Notes
- 3-2 all LID facility locations have been identified
- 3-3 driving routes and site access locations have been marked
- 3-4 material storage areas have been identified and won't impact facility
- 3-5 utility locations confirmed and identified
- 3-6 contributing drainage area is stabilized and flow has been diverted (if applicable)
- 3-7 soil test conducted (if applicable)

EROSION AND SEDIMENT CONTROL

- 4-1 temporary ESC has been installed correctly and in relevant locations Notes
- 4-2 non-disturbance areas have been protected
- 4-3 emergency ESC items ready and available

CONSTRUCTION CLEARING AND GRUBBING

- 5-1 vegetation marked for removal is solely within facility footprint or access routes Notes

EXCAVATION

- 6-1 excavation is not taking place in wet or saturated conditions Notes
- 6-2 temporary ESC has been checked and is still functioning and properly located
- 6-3 equipment is operating from outside the facility (or has been approved to operate within)
- 6-4 material stockpiles are away from the facility and protected from run-on, run-off and wind erosion
- 6-5 size and shape of facility matches design (according to survey)
- 6-6 rocks and roots are removed
- 6-7 no standing water or groundwater present
- 6-8 all elevations conform with plan

GEOTEXTILE AND IMPERMEABLE LINERS

- 7-1 material meets design specifications Notes
- 7-2 size of fabric is sufficient for design and to overlap ends
- 7-3 material is free from dust, dirt or mud
- 7-4 material is free from holes or tears
- 7-5 material is laid and pulled taught, no wrinkles present
- 7-6 impermeable liners only: placement, field welding and seals conform with design specifications

UNDERDRAIN

- 8-1 pipe size and material is as per specifications Notes
- 8-2 pipe is undamaged
- 8-3 correct and sufficient fittings are on site
- 8-4 orientation of underdrain perforations and cleanouts matches design
- 8-5 pipe is laid to the correct grade
- 8-6 pipe is in correct vertical location in trench cross-section

AGGREGATES AND EDGING

- 9-1 rock gradation meets specifications Notes
- 9-2 storage is on a hard surface or a geotextile
- 9-3 rocks is washed and free from debris
- 9-4 aggregate is being spread with a front-end loader (not dumped)
- 9-5 subbase has been moistened to facilitate base material movement into reservoir course
- 9-6 edge restraints are in place before base layer installation, and conform to design
- 9-7 bedding course has been placed and screeded
- 9-8 installation thickness, placement, compaction and surface tolerances meet specifications for all layers

SOIL MEDIA

- 10-1 stockpile location is stabilized and not at risk of contamination Notes
- 10-2 soil test meets specifications and will sustain plant life
- 10-3 equipment operating from outside the facility
- 10-4 soil depth matches design

SEED AND WATERING

- 11-1 seed source has been approved Notes
- 11-2 seed has been installed as per City standards and approved drawings
- 11-3 contractor has submitted watering schedule and it has been approved

INSTALLATION INSPECTION

- 12-1 installation is not being performed in rain or snow Notes
- 12-2 during placement, any damaged or missing pavers or grid units are replaced
- 12-3 pavers are cut away from the pavement and/or pavement is protected from sediment
- 12-4 if being used, joint aggregate matches design and is clean
- 12-5 if being used, joint aggregate has been swept into joints and cleaned prior to compaction
- 12-6 pavers are being seated with a low-amplitude 5,000 lbf (22-kN) plate compactor at 75 to 95 Hz
- 12-7 if continuing work the next day, compaction is to within 1.8m of the laying face for the next day
- 12-8 if being used, topsoil meets City requirements
- 12-9 if being used, topsoil has been installed to the lip of the paver unit
- 12-10 if being used, seed is spread and watered once soil is prepared

Additional Notes

Facility Name: _____

Facility Location: _____

PRE-INSPECTION

Inspector Name _____ Date: _____

Supervisor Name: _____

STARTING THE CCC PROCESS

Notes

- T1-1 all material testing results and certifications have been submitted
- T1-2 City inspection has been requested or application for CCC submitted and reviewed
- T1-3 proprietary devices are operational and comply with design

SITE STABILIZATION AND EROSION AND SEDIMENT CONTROL

Notes

- T2-1 free of on-site erosion issues
- T2-2 drainage area is not contributing sediment

CONCRETE WORK

Notes

- T3-1 all concrete is free of damage or cracks
- T3-2 concrete curbs are the proper elevation and location

UNDERDRAINS

Notes

- T4-1 invert elevations have been surveyed and pipe slope matches design
- T4-2 cleanout and/or overflow is accessible
- T4-3 cleanout and/or overflow locations and elevations match design
- T4-4 pipe size and material matches design
- T4-5 no standing water is present in observation well
- T4-6 pipe has been flushed and CCTV video inspected (optional)
- T4-7 CCTV video inspection did not identify issues (optional)

FACILITY SURFACE AND GRADING

Notes

- T5-1 no debris (trash or excessive leaf litter)
- T5-2 no sediment accumulation on facility
- T5-3 grading is within City tolerances
- T5-4 pavement is not overly compacted
- T5-5 no signs of raveling, settlement cracking or other degradation present
- T5-6 surface is smooth and even
- T5-7 facility permeability passes (application of 23 lpm clean water on surface)

Additional Notes and Follow-up Actions

CITY INSPECTION

Drainage Inspector Name _____ Date: _____

Supervisor Name: _____

Roadway Design Inspector Name _____

Supervisor Name: _____

- T6-1 facility pre-inspected and any identified deficiencies have been corrected Notes
- T6-2 start-up checklist, sub-contractor orientations and ESC inspections submitted
- T6-3 any documented compaction and/or sedimentation has been remedied
- T6-4 material submittals have been submitted and reviewed
- T6-5 as-build survey completed and plans passed to Roadway Maintenance and Drainage
- T6-6 facility grading has been verified to be within City tolerance
- T6-7 hard-scaping and pre-treatment passed pre-inspection
- T6-8 CCTV video inspection did not identify issues
- T6-9 visual inspection of facility has been performed and passes
- T6-10 facility permeability passes (application of 23 lpm clean water on surface)
- T6-11 facility is free from deficiencies

Additional Notes and Follow-up Actions

PERMEABLE UNIT PAVERS OR OPEN GRID PAVERS	CCC INSPECTION REPORT	File No.:
--	-----------------------	-----------

Facility Name: _____
 Facility Location: _____

PRE-INSPECTION

Inspector Name _____ Date: _____
 Supervisor Name: _____

SOFT LANDSCAPING

Inspector Name _____ Date: _____
 Supervisor Name: _____

START OF CCC PROCESS

- Notes
- L1-1 maintenance and water schedules have been submitted
 - L1-2 City inspection has been requested or application for CCC submitted and reviewed

SITE STABILIZATION AND EROSION AND SEDIMENT CONTROL

- Notes
- L2-1 free of on-site erosion issues
 - L2-2 drainage area is not contributing sediment

SEED AND SOD

- Notes
- L3-1 seed germination (signs of establishment)
 - L3-2 complete coverage (no bare patches)
 - L3-3 turf weed free
 - L3-4 meets appropriate design grade
 - L3-5 no damages
 - L3-6 healthy
 - L3-7 watered

Additional Notes and Follow-up Actions

DRAINAGE AND TRANSPORTATION PRE-INSPECTION

STARTING THE CCC PROCESS

- T1-1 all material testing results and certifications have been submitted Notes
- T1-2 City inspection has been requested or application for CCC submitted and reviewed
- T1-3 proprietary devices are operational and comply with design

SITE STABILIZATION AND EROSION AND SEDIMENT CONTROL

- T2-1 free of on-site erosion issues Notes
- T2-2 drainage area is not contributing sediment

CONCRETE WORK

- T3-1 all concrete is free of damage or cracks Notes
- T3-2 concrete curbs are the proper elevation and location

UNDERDRAINS

- T4-1 invert elevations have been surveyed and pipe slope matches design Notes
- T4-2 cleanout and/or overflow is accessible
- T4-3 cleanout and/or overflow locations and elevations match design
- T4-4 pipe size and material matches design
- T4-5 no standing water is present in observation well
- T4-6 pipe has been flushed and CCTV video inspected (optional)
- T4-7 CCTV video inspection did not identify issues (optional)

FACILITY SURFACE AND GRADING

- T5-1 no debris (trash or excessive leaf litter) Notes
- T5-2 no sediment accumulation on facility
- T5-3 grading is within City tolerances
- T5-4 pavers are even, seated and undamaged
- T5-5 joint aggregate is filled to the lip of paver and no areas of settlement are visible
- T5-6 joint aggregate is free from sediment, debris, moss or other blockages
- T5-7 facility permeability passes (application of 23 lpm clean water on surface)

Additional Notes and Follow-up Actions

CITY INSPECTION

Drainage Inspector Name _____

Date: _____

Supervisor Name: _____

Roadway Design Inspector Name _____

Supervisor Name: _____

- T6-1 facility pre-inspected and any identified deficiencies have been corrected Notes
- T6-2 start-up checklist, sub-contractor orientations and ESC inspections submitted
- T6-3 any documented compaction and/or sedimentation has been remedied
- T6-4 material submittals have been submitted and reviewed
- T6-5 as-built survey completed and plans passed to Roadway Maintenance and Drainage
- T6-6 facility grading has been verified to be within City tolerance
- T6-7 hard-scaping and pre-treatment passed pre-inspection
- T6-8 CCTV video inspection did not identify issues
- T6-9 visual inspection of facility has been performed and passes
- T6-10 facility permeability passes (application of 23 lpm clean water on surface)
- T6-11 facility is free from deficiencies

Additional Notes and Follow-up Actions

Facility Name: _____

Facility Location: _____

PRE-INSPECTION

Inspector Name _____

Date: _____

Supervisor Name: _____

STARTING THE FAC PROCESS

Notes

- T1-1 all maintenance logs have been submitted
- T1-2 *Total Capital Asset Form* completed and submitted it to the City
- T1-3 as-built drawings with application for FAC sent to City
- T1-4 3 copies of FAC application and applicable documentation sent to City

SITE STABILIZATION AND EROSION AND SEDIMENT CONTROL

Notes

- T2-1 free of on-site erosion issues
- T2-2 drainage area is not contributing sediment

CONCRETE WORK

Notes

- T3-1 all concrete is free of damage or cracks
- T3-2 concrete curbs are the proper elevation and location

UNDERDRAINS

Notes

- T4-1 clean-out and/or observation well is accessible
- T4-2 no standing water is present in observation well
- T4-3 pipe has been flushed and CCTV video inspected (optional)
- T4-4 CCTV video inspection did not identify issues (optional)

FACILITY SURFACE AND GRADING

Notes

- T5-1 no debris (trash or excessive leaf litter)
- T5-2 no sediment accumulation on facility
- T5-3 no signs of settlement present
- T5-4 no signs of raveling, settlement cracking or other degradation present
- T5-5 facility permeability passes (application of 23 lpm clean water on surface)

Additional Notes and Follow-up Actions

CITY INSPECTION

Drainage Inspector Name _____

Date: _____

Supervisor Name: _____

Drainage Design Inspector Name _____

Supervisor Name: _____

- T6-1 facility pre-inspected and any identified deficiencies have been corrected
- T6-2 as-build survey completed and plans passed to Roadway Maintenance and Drainage
- T6-3 facility grading has it been verified to be within City tolerance
- T6-4 hard-scaping and pre-treatment passed pre-inspection
- T6-5 CCTV video inspection did not identify issues
- T6-6 visual inspection of facility has been performed and passes
- T6-7 facility permeability passes (application of 23 lpm clean water on surface)
- T6-8 facility is free from deficiencies

Notes

Additional Notes and Follow-up Actions

Facility Name: _____

Facility Location: _____

SOFT LANDSCAPING

Inspector Name _____

Date: _____

Supervisor Name: _____

STARTING THE FAC PROCESS

- L1-1 maintenance logs and water logs have been submitted Notes
- L1-2 *Total Capital Asset Form* and submitted it to the City
- L1-3 As-Built drawings with application for FAC sent to City
- L1-4 pre-inspection of the site has taken place and necessary repairs fixed
- L1-5 3 copies of FAC application and applicable documentation sent to City

SITE STABILIZATION AND EROSION AND SEDIMENT CONTROL

- L2-1 free of on-site erosion issues Notes
- L2-2 drainage area is not contributing sediment

SEED AND SOD

- L3-1 seed germination (signs of establishment) Notes
- L3-2 complete coverage (no bare patches)
- L3-3 turf weed free
- L3-4 meets appropriate design grade
- L3-5 no damages
- L3-6 healthy
- L3-7 watered

Additional Notes and Follow-up Actions

DRAINAGE AND TRANSPORTATION PRE-INSPECTION

Inspector Name _____

Date: _____

Supervisor Name: _____

STARTING THE FAC PROCESS

- T1-1** all maintenance logs have been submitted Notes
- T1-2** *Total Capital Asset Form* completed and submitted it to the City
- T1-3** as-built drawings with application for FAC sent to City
- T1-4** 3 copies of FAC application and applicable documentation sent to City

SITE STABILIZATION AND EROSION AND SEDIMENT CONTROL

- T2-1** free of on-site erosion issues Notes
- T2-2** drainage area is not contributing sediment

CONCRETE WORK

- T3-1** all concrete is free of damage or cracks Notes
- T3-2** concrete curbs are the proper elevation and location

UNDERDRAINS

- T4-1** clean-out and/or observation well is accessible Notes
- T4-2** no standing water is present in observation well
- T4-3** pipe has been flushed and CCTV video inspected (optional)
- T4-4** CCTV video inspection did not identify issues (optional)

FACILITY SURFACE AND GRADING

- T5-1** no debris (trash or excessive leaf litter) Notes
- T5-2** no sediment accumulation on facility
- T5-3** grading is within City tolerances
- T5-4** pavers are even, seated and undamaged
- T5-5** joint aggregate is filled to the lip of paver and no areas of settlement are visible
- T5-6** joint aggregate is free from sediment, debris, moss or other blockages
- T5-7** facility permeability passes (application of 23 lpm clean water on surface)

Additional Notes and Follow-up Actions

CITY INSPECTION

Drainage Inspector Name _____

Date: _____

Supervisor Name: _____

Roadway Design Inspector Name _____

Supervisor Name: _____

- T6-1** facility pre-inspected and any identified deficiencies have been corrected Notes
- T6-2** as-build survey completed and plans passed to Roadway Maintenance and Drainage
- T6-3** facility grading has it been verified to be within City tolerance
- T6-4** hard-scaping and pre-treatment passed pre-inspection
- T6-5** CCTV video inspection did not identify issues
- T6-6** visual inspection of facility has been performed and passes
- T6-7** facility permeability passes (application of 23 lpm clean water on surface)
- T6-8** facility is free from deficiencies

Additional Notes and Follow-up Actions

Permeable Pavement	Maintenance Inspection Checklist	File No.:
---------------------------	---	------------------

Facility Name: _____

Date: _____

Facility Location: _____

Current Weather: _____

Inspector Name: _____

Group: _____

Supervisor Name: _____

Rain in last 24 hours?	Yes	No
How Much?		mm

P = Pass; Mi = Minor; Mo = Moderate; S = Severe

VISUAL INSPECTION

Inspect early spring after snowmelt and late fall prior to snowfall

CONTRIBUTING DRAINAGE AREA

	P	Mi	Mo	S	Item	<u>Notes</u>
CDA-1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	free of debris, trash, leaf fall	
CDA-2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	no sources of sediment present	

SURFACE

	P	Mi	Mo	S	Item	<u>Notes</u>
S-1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	uneven, missing or damaged pavers	
S-2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	raveling, cracks or potholes	
S-3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	debris	
S-4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	sedimentation	
S-5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	debris and/or sediment in paver joints	
S-6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	joint aggregate top-up	
S-7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	vegetation coverage	
S-8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	weeds	

PERFORMANCE INSPECTION

Inspect after rainfall events >25mm

FACILITY WIDE

	P	Mi	Mo	S	Item	<u>Notes</u>
PI-1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	standing water and infiltration	

WINTER INSPECTION

Inspect after first plough

FACILITY WIDE

	P	Mi	Mo	S	Item	<u>Notes</u>
WI-1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	CDA is free of sediment and grit	
WI-2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	facility is not being used as snow storage	
WI-3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	facility has not been damaged by plows	

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Naturalized Drainage Way Checklists

INTRODUCTION	COMPANION RESOURCES	TENDERING & PRE-CONSTRUCTION	CONSTRUCTION	PROJECT ACCEPTANCE	MAINTENANCE	GLOSSARY	REFERENCES	CHECKLISTS
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Facility name: _____	Date: _____
Facility location: _____	Current weather: _____
Inspector name and group: _____	Rain in last 24 hours? Yes No
Supervisor name and group: _____	How Much? mm

**PRECONSTRUCTION
GENERAL**

- 1-1 meeting set up between the contractor, client and consultant Notes
- 1-2 roles and lines of communication confirmed (sub-contractor orientation plan discussed)
- 1-3 construction process and sequencing have been discussed
- 1-4 construction driving routes have been discussed and will be marked
- 1-5 schedules for construction and routine/non-routine inspections confirmed
- 1-6 importance of ESC discussed and ESC plan and/or proposed location of temporary ESC reviewed
- 1-7 material handling and storage areas discussed
- 1-8 material testing and potential impact on schedule discussed
- 1-9 discuss importance of protecting existing habitat, vegetation, air and water quality

SITE PREPARATION

- 2-1 project boundaries confirmed and marked Notes
- 2-2 all LID facility locations have been identified
- 2-3 driving routes and site access locations have been marked
- 2-4 material storage areas have been identified and won't impact facility
- 2-5 utility locations confirmed and identified
- 2-6 contributing drainage area is stabilized and flow has been diverted (if applicable)
- 2-7 all non-facility impervious cover is installed and equipment has been de-mobilized
- 2-8 soil test conducted (if applicable)

EROSION AND SEDIMENT CONTROL

- 3-1 temporary ESC has been installed correctly and in relevant locations Notes
- 3-2 non-disturbance areas have been protected
- 3-3 emergency ESC items ready and available

**OVERWINTER
FACILITY WIDE**

- 4-1 winter weather has been considered for construction scheduled adjacent to winter months (October 15 onwards) Notes
- 4-2 site has been sufficiently stabilized prior to October 15
- 4-3 are areas yet to be stripped in the month of October less than 0.4 ha (~1 acre)
- 4-4 previously stripped areas have been stabilized before moving onto new areas
- 4-5 if facility is to be online over winter, the contributing drainage area has been stabilized
- 4-6 soil stabilization (sod, erosion blanket, mulch) has been installed correctly and anchored

**CONSTRUCTION
CLEARING AND GRUBBING**

- 5-1 vegetation marked for removal is solely within facility footprint or access routes Notes

EXCAVATION

- 6-1 excavation is not taking place in wet or saturated conditions Notes
- 6-2 temporary ESC has been checked and is still functioning and properly located
- 6-3 equipment is operating from outside the facility (or has been approved to operate within)
- 6-4 unsuitable material is not stockpiled in a location that could contaminate the facility
- 6-5 salvageable soil has been stockpiled offsite in a location where it will not become contaminated
- 6-6 size and shape of facility matches design (according to survey)
- 6-7 overland flow routes are directed to proper inlet
- 6-8 inlets are not higher than contributing drainage area
- 6-9 no voids due to rocks or roots
- 6-10 no standing water

SCARIFICATION *If Specified*

- 7-1 soils have been scarified (if subgrade has been compacted or design calls for scarification) Notes

ROUGH GRADE

- 8-1 all elevations (inlets, outlets, overflow, longitudinal slope) match design Notes

GEOTEXTILE *If Specified*

- 9-1 material is as per specifications Notes
- 9-2 size of fabric is sufficient for design and to overlap ends
- 9-3 fabric is free from dust, dirt or mud
- 9-4 installation meets specification, design location and elevation

UNDERDRAIN AND OVERFLOW DRAIN *If specified*

- 10-1 pipe size and material is as per specifications Notes
- 10-2 pipe is undamaged
- 10-3 correct and sufficient fittings are on site
- 10-4 orientation of underdrain perforations and cleanouts matches design
- 10-5 underdrain pipe is laid to the correct grade
- 10-6 underdrain pipe is in correct vertical location in trench cross-section
- 10-7 overflow drain location and orientation is correct
- 10-8 overflow drain rim elevation matches design

RESERVOIR COURSE AND OTHER AGGREGATE

- 11-1 rock gradation meets specifications, submittal received and approved Notes
- 11-2 rocks are rounded
- 11-3 rock is washed and free from debris
- 11-4 equipment operating from outside the facility
- 11-5 installation depth meets specifications

AMENDED SOIL MEDIA, FINISH GRADING AND EROSION CONTROL MATTING

- 12-1 soil stockpile location is stabilized and not at risk of contamination Notes
- 12-2 soil test meets specifications and will sustain plant life
- 12-3 soil installation equipment is operating from outside the facility or a slinger truck is being used
- 12-4 soil is being placed in 150mm lifts and hydraulically compacted or boot-compacted
- 12-5 soil depth matches design
- 12-6 facility bottom is level (if not level, this matches design)
- 12-7 finish grades match design
- 12-8 erosion control matting meets specification and submittal received and approved
- 12-9 erosion control matting has been installed correctly

GRADE CONTROL STRUCTURES

- 13-1 drop structure (grass berm, check dam or equivalent) meets specification Notes
- 13-2 equipment operating from outside the facility
- 13-3 installation height meets specification

RIPRAP

- 14-1 material is as per specifications Notes
- 14-2 material has been installed evenly
- 14-3 material is installed at the design grade and elevation

VEGETATION/WATERING/MULCH

- 15-1 plant material and source have been approved prior to installation Notes
- 15-2 plant material inspected upon delivery and approved prior to installation
- 15-3 plant material has been installed as per City standards and approved drawings
- 15-4 water schedule has been submitted and approved
- 15-5 mulch material meets specification
- 15-6 mulch has been evenly distributed and installed to the correct depth
- 15-7 mulch used to achieve finish grade and not blocking inlets or overflows
- 15-8 vegetation outside of LID facility been installed and site stabilized

Additional Notes

Facility Name: _____

Facility Location: _____

SOFT LANDSCAPING

Inspector Name _____

Date: _____

Supervisor Name: _____

START OF CCC PROCESS

- L1-1 have maintenance and water schedules been submitted
- L1-2 City inspection has been requested or application for CCC submitted

SITE STABILIZATION AND EROSION AND SEDIMENT CONTROL

- L2-1 free of on-site erosion issues
- L2-2 drainage area is not contributing sediment

FACILITY SURFACE

- L3-1 no standing water
- L3-2 no debris (trash or excessive leaf litter)
- L3-3 no sediment accumulation in facility
- L3-4 facility is free of ruts and/ or non-design rocks
- L3-5 no topsoil settlement is visible (adequate depth of soil)

PLANT MATERIAL

- L4-1 trees, shrubs, grasses and herbaceous plants planted as per City standards
- L4-2 size of plant material as per City standards and approved drawings
- L4-3 quantities of plant material match approved drawings
- L4-4 trees pest free
- L4-5 shrubs pest free
- L4-6 trees and shrubs pruned and free of deadwood
- L4-7 plant material is healthy
- L4-8 plant material is watered and water schedule logs have been submitted
- L4-9 facility is free of invasive plant species
- L4-10 trees have been planted at appropriate depth
- L4-11 tree basket have been removed
- L4-12 trees have been staked as per City standards

MULCH *If Specified*

- L5-1 mulch topped up to required depth and stable (not floating/ drifting)
- L5-2 plant beds and mulch rings weed free
- L5-3 well distributed and uniform
- L5-4 meets appropriate design grade

TURF

- L6-1 seed germination (signs of establishment)
- L6-2 complete coverage (no bare patches)
- L6-3 sod knit (*if specified*)
- L6-4 turf weed free
- L6-5 meets appropriate design grade
- L6-6 no damages
- L6-7 healthy
- L6-8 watered/ fertilized

Additional Notes and Follow-up Actions

DRAINAGE PRE-INSPECTION

Inspector Name _____

Date: _____

Supervisor Name: _____

STARTING THE CCC PROCESS

- D1-1 all material testing results and certifications have been submitted
- D1-2 City inspection has been requested or application for CCC submitted
- D1-3 proprietary devices are operational and comply with design

CONCRETE WORK

- D2-1 all concrete is free of damage or cracks
- D2-2 concrete curbs are the proper elevation and location
- D2-3 concrete inlets are the correct style specified on drawings
- D2-4 concrete pre-treatment is the correct size, location and elevation

GRADING

- D3-1 flows from contributing drainage area do not bypass facility
- D3-2 grading within the facility does not short-circuit to the outlet
- D3-3 flow evenly distributes within the facility and bottom is level
- D3-4 side slopes match the design
- D3-5 inlet, outlet and overflow elevations match the design
- D3-6 drop structure (grass berm, check dam or equivalent) meets specification

UNDERDRAINS *(If Specified)*

- D4-1 invert elevations have been surveyed and pipe slope matches design
- D4-2 cleanout and/or overflow locations and elevations match design
- D4-3 cleanout caps are accessible and secure
- D4-4 pipe size and material matches design
- D4-5 pipe has been flushed and CCTV video inspected (optional)
- D4-6 CCTV video inspection did not identify issues (optional)

RIPRAP *If Specified*

- D5-1 riprap at required depth and stable
- D5-2 meets appropriate design grade

Additional Notes and Follow-up Actions

DRAINAGE INSPECTION

Inspector Name _____

Date: _____

Supervisor Name: _____

- D6-1 facility pre-inspected and any identified deficiencies have been corrected
- D6-2 start-up checklist, sub-contractor orientations and ESC inspections submitted
- D6-3 any documented compaction and/or sedimentation has been remedied
- D6-4 proprietary devices passed pre-inspection
- D6-5 facility grading has it been verified to be within City tolerance
- D6-6 hard-scaping and pre-treatment passed pre-inspection
- D6-7 CCTV video inspection did not identify issues
- D6-8 visual inspection of facility has been performed and passes
- D6-9 no signs of long-term ponding
- D6-10 facility is free from deficiencies

Additional Notes and Follow-up Actions

Facility Name: _____

Facility Location: _____

SOFT LANDSCAPING

Inspector Name _____

Date: _____

Supervisor Name: _____

STARTING THE FAC PROCESS

- L1-1 have maintenance logs and water logs have been submitted and reviewed
- L1-2 *Total Capital Asset Form* submitted to the City
- L1-3 FAC application submitted to City and as-built drawings included
- L1-4 pre-inspection of the site has taken place, report submitted and deficiencies fixed
- L1-5 3 copies of FAC application and applicable documentation sent to City

SITE STABILIZATION AND EROSION AND SEDIMENT CONTROL

- L2-1 free of on-site erosion issues
- L2-2 drainage area is not contributing sediment

FACILITY SURFACE

- L3-1 no standing water
- L3-2 no debris (trash or excessive leaf litter)
- L3-3 no sediment accumulation in facility
- L3-4 facility is free of ruts and/ or non-design rocks
- L3-5 no topsoil settlement is visible (adequate depth of soil)

PLANT MATERIAL

- L4-1 trees and shrubs planted as per City standards and approved drawings
- L4-2 size of plant material as per City standards and approved drawings
- L4-3 quantities of trees and shrubs match approved drawings
- L4-4 trees pest free
- L4-5 shrubs pest free
- L4-6 trees and shrubs pruned and free of deadwood
- L4-7 plant material is healthy
- L4-8 plant material has been recently watered
- L4-9 facility is free of invasive plant species
- L4-10 trees have been planted at appropriate depth
- L4-11 tree baskets have been removed
- L4-12 trees have been staked as per City standards

MULCH *If Specified*

- L5-1 mulch topped up to required depth and stable (not floating/ drifting)
- L5-2 plant beds and mulch rings weed free
- L5-3 mulch is well distributed and uniform
- L5-4 meets design finish grade

TURF

- L6-1 seed germination (signs of establishment)
- L6-2 sod knit
- L6-3 turf weed free
- L6-4 meets design finish grade
- L6-5 no damages
- L6-6 healthy

Additional Notes and Follow-up Actions

DRAINAGE PRE-INSPECTION

Inspector Name _____

Date: _____

Supervisor Name: _____

STARTING THE FAC PROCESS

- D1-1 record drawings submitted at least 6 months prior to application
- D1-2 documentation, such as maintenance and service manuals are submitted and reviewed
- D1-3 site has been prepared by contractor for inspection
- D1-4 3 copies of the FAC application, and applicable documentation, have been submitted to the Development Coordination Section

CONCRETE WORK

- D2-1 all concrete is free of damage or cracks
- D2-2 concrete curbs are the proper elevation and location
- D2-3 inlets as specified on drawings
- D2-4 concrete pre-treatment (e.g. settling basin) is the correct size, location and elevation

Notes

GRADING

- D3-1 flow from contributing drainage area does not bypass facility
- D3-2 grading within the facility does not short-circuit to the outlet
- D3-3 flow evenly distributes along facility bottom and longitudinal slope matches design
- D3-4 side slopes match the design
- D3-5 inlet, outlet and overflow elevations match the design
- D3-6 drop structure (grass berm, check dam or equivalent) meets specification

Notes

UNDERDRAINS (If Specified)

- D4-1 invert elevations have been surveyed and pipe slope matches design
- D4-2 cleanout and/or overflow locations and elevations match design
- D4-3 cleanout caps are accessible and secure
- D4-4 pipe size and material matches design
- D4-5 pipe has been flushed and CCTV video inspected (optional)
- D4-6 CCTV video inspection did not identify issues (optional)

Notes

RIPRAP (If Specified)

- D5-1 Riprap at required depth and stable
- D5-2 meets appropriate design grade

Additional Notes and Follow-up Actions

DRAINAGE INSPECTION

Inspector Name _____

Date: _____

Supervisor Name: _____

Notes

- D6-1 facility pre-inspected and any identified deficiencies have been corrected
- D6-2 CCTV video inspection did not identify issues
- D6-3 visual inspection of facility has been performed and passes
- D6-4 all deficiencies have been cleared in the permitted time period
- D6-5 facility is free from deficiencies

Additional Notes and Follow-up Actions

NATURALIZED DRAINAGE WAY	MAINTENANCE INSPECTION CHECKLIST	File No.:
--------------------------	----------------------------------	-----------

Facility Name: _____

Date: _____

Facility Location: _____

Current Weather: _____

Inspector Name and Group: _____

Supervisor Name: _____

Rain in last 24 hours? Yes No
How Much? mm

P = Pass; Mi = Minor; Mo = Moderate; S = Severe

VISUAL INSPECTION

CONTRIBUTING DRAINAGE AREA Responsible group: Parks or Transportation

	P	Mi	Mo	S	Item	Notes
CDA-1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	free of debris, trash, leaf fall	
CDA-2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	no sources of sediment present	

PRE-TREATMENT

	P	Mi	Mo	S	Item	Notes
PT-1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	requiring clean-out	
PT-2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	structural integrity	

INLET

	P	Mi	Mo	S	Item	Notes
I-1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	inlet flow capture	
I-2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	inlet obstruction	
I-3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	inlet erosion	
I-4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	inlet structural integrity	

BOUNDARY ZONE

	P	Mi	Mo	S	Item	Notes
BZ-1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	facility size matches design	
BZ-2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	boundary debris and/or trash	
BZ-3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	boundary side slope erosion	
BZ-4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	planter box structural integrity	<i>*not applicable to naturalized drainage way</i>
BZ-5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	facility enclosure	

BED AND VEGETATED ZONE

	P	Mi	Mo	S	Item	Notes
BVZ-1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	evidence amended soil does not meet design	
BVZ-2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	bed zone debris and/or trash	
BVZ-3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	bed zone erosion, bare patches or sinking	
BVZ-4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	bed zone sediment accumulation	
BVZ-5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	grade control structures	
BVZ-6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	riprap condition <i>(if specified)</i>	
BVZ-7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	mulch depth and condition <i>(if specified)</i>	
BVZ-8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	plant material health	
BVZ-9	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	plant material density and coverage	
BVZ-10	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	landscape aesthetics	
BVZ-11	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	weeds and/or invasive species	

OUTLET ZONE

	P	Mi	Mo	S	Item	Notes
OZ-1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	underdrains, clean-outs, overflows	
OZ-2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	outlet obstruction	
OZ-3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	outlet structural integrity	

PERFORMANCE INSPECTION*Inspect after rainfall events >25mm***FACILITY WIDE**

	P	Mi	Mo	S	Item	<u>Notes</u>
PI-1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	CDA matches design	
PI-2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	flow is directed to inlet	<i>*not applicable to naturalized drainage way</i>
PI-3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	flow distribution in facility bed	
PI-4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	ponding depth	
PI-5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	drawdown time and standing water	

WINTER INSPECTION*Inspect twice over winter months (1) after first snow plough (2) once spring melt begins***FACILITY WIDE**

	P	Mi	Mo	S	Item	<u>Notes</u>
WI-1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	CDA is free of sediment and grit	
WI-2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	facility is not being used as snow storage	
WI-3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	facility has not been damaged by plows	
WI-4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	flow route to facility is clear	