Seattle Public Utilities

King County
Department of
Natural Resources and Parks
Wastewater Treatment Division

Green Stormwater Infrastructure in Seattle

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Working Together to Protect our Waterways

Green Stormwater Infrastructure for Capital Improvement Projects

Volume II: Options Analysis

Update January 2020

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This is the second of five volumes of the Green Stormwater Infrastructure Manual for Capital Improvement Projects (GSI Manual). Please consult with other volumes for additional information.

VOLUME:

I	Project Initiation / Partnering Framework
II	**Options Analysis**
III	Design Phase
IV	Construction, On-Boarding & Commissioning
V	Operations & Maintenance

This GSI Manual supplements (not replaces) City and County project guidelines and manuals for Seattle Public Utilities (SPU) Options Analysis phase and King County Wastewater Treatment Division's Problem Definition and Alternative Analysis phases.

This document was compiled by Jacobs under MIG|SvR's prime consultant contract with SPU for the SPU and King County Wastewater Treatment Division (WTD) joint GSI Program (SPU Contract C12-004). Additional contributors to this document included representatives from SPU, WTD, Seattle Department of Transportation (SDOT), MIG|SvR and PRR. For revisions or comments on this document, contact:

Shanti Colwell, SPU: **Shanti.Colwell@seattle.gov**
Faon O'Connor, WTD: **Faon.OConnor@kingcounty.gov**

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Volume II: Options Analysis Phase Table of Contents

Figures

Tables

Appendices

Acronyms*

*See COS Standard Plan (COS Std Plan 002) for other General Abbreviations used for Street Improvement Permitting plans in City's ROW

Term	Acronym Definition
AA	Alternative Analysis (WTD term)
AAC	Arterial Asphalt and Concrete
BMPs	best management practices
BOD	basis of design
BSM	bioretention soil matrix
CIP	capital improvement project
CMOM	capacity management, operation, and maintenance
COS	City of Seattle
CSO	combined sewer overflow
DSO	Development Services Office for City of Seattle
DSG	Seattle Public Utilities Design Standards and Guidelines
DWW	drainage and wastewater (SPU term)
ECAs	environmentally critical areas
GIS	geographic information system
GSI	green stormwater infrastructure
LOB	line of business (SPU term)
MEF	maximum extent feasible
MEP	maximum extent practicable
NPDES	National Pollutant Discharge Elimination System
NDS	natural drainage system (SPU term)
OA	Options Analysis (SPU term)
O&M	operations and maintenance
PERC	preliminary engineering resource composite
PDB	Project Delivery Branch representative (SPU term)
PDEB	Project Delivery and Execution Branch (SPU term)
PMP	Project management plan
PEP	public engagement plan
PSE	Puget Sound Energy
RCEC	request to change an existing contract (SPU term)
ROW	right-of-way
ROWIM	Seattle Streets Illustrated, the Right-of-Way Improvements Manual
SCL	Seattle City Light
SDCI	Seattle Department of Construction & Inspections
SDOT	Seattle Department of Transportation
SPU	Seattle Public Utilities

Term	**Acronym Definition (Continued)**
SEPA	State Environmental Policy Act
SOPA	System Operations Planning and Analysis group (SPU term)
TBL	triple bottom line
WTD	King County Wastewater Treatment Division

Definitions

These definitions are focused on implementing green stormwater infrastructure (GSI) in the City's right-of-way (ROW) as part of capital improvement projects (as opposed to implementation on parcels).

Best Management Practice (BMP):

Best Management Practice refers to a method that has been determined to be the most effective and practical means of preventing or reducing non-point source pollution to help achieve water quality goals. BMPS include measures to prevent pollution as well as measures to mitigate pollution. In Seattle, GSI BMPs include green roofs, downspout disconnection, trees, rain gardens, bioretention, biofiltration swales, pocket wetlands, and permeable surfaces. *See "GSI" in this section.*

Bioretention:

Bioretention refers to an engineered, shallow earthen depression facility with engineered soil and plants to provide water quality treatment and either retain or detain the treated stormwater for flow attenuation. The facility is designed to mimic natural processes by filtering stormwater through the vegetation and into the imported bioretention soil mix (BSM). When designed with required BSM depth (at least 18 inches), bioretention facilities provide "enhanced" water quality treatment in accordance with COS Stormwater Manual, Volume 3, Section 5.4.4 (infiltrating bioretention) and Section 5.8.2 (non-infiltrating bioretention).

In the ROW, stormwater enters the bioretention facility through sheet flow across landscape/pavement; through breaks in the curb along the roadway or sidewalk; and/or through a piped/culvert system daylighting into the facility. Individual depressions within a bioretention facility are called "**cells.**" Once stormwater has filtered through the vegetation and downward through BSM, the method of discharge could be infiltration, underdrain, or both into a downstream system (e.g., public storm sewer, deep infiltration facility). See GSI Manual, Volume III: Design Phase for more information on bioretention cells and associated infrastructure for applications in the ROW.

Rain gardens are defined as a different type of facility in the City's code — not bioretention — and have different design criteria, as noted in the City of Seattle Stormwater Manual and Washington state Department of Ecology's Stormwater Management Manual for Western Washington. See "rain garden" in this section for definition. The lay term natural drainage system (NDS) may also be used to describe bioretention in public Outreach Materials for capital improvement projects (CIPs) led by SPU.

Definitions (Continued)

Block:

Refers to a street length from intersection to intersection. A block includes the street and adjacent private/public parcels (residential, commercial, parks, etc.). *A city block can range from 300 to 800 feet long, and can be of varying widths. A block is surrounded on four corners by public street right-of-way and might include a public alley through the block.*

Cells:

See “bioretention” in this section.

Conveyance Swale:

Conveyance swale refers to shallow, vegetated earthen channel to convey stormwater runoff (as opposed to a piped system). See COS Standard Plan 294 for cross-section of a vegetated conveyance swale that is not for water quality treatment.

Facility:

A facility refers to a BMP structure, such as a bioretention cell.

Green Stormwater Infrastructure (GSI):

In the City of Seattle (City), GSI is a set of distributed stormwater best management practices that mimic natural systems. GSI is used across multiple scales and site contexts, including residential and commercial, as well as in the public right-of-way. It delivers multiple community benefits in addition to stormwater management. GSI BMPs are designed to reduce runoff from development using infiltration, evapotranspiration, and/or stormwater reuse. To be considered GSI, it must provide a function in addition to stormwater management, such as water reuse, or providing greenspace and/or habitat in the City. Types of GSI include rain gardens, bioretention, green roofs, permeable pavement, cisterns and trees. Other definitions of GSI are provided by the Environmental Protection Agency, as well as City of Seattle and King County Consent Decrees.

Natural Drainage System (NDS):

A term used by SPU for a bioretention facility in the right-of-way. See definition for “bioretention” in this section.

Definitions (Continued)

Permeable Pavement Facilities:

Permeable pavement is a paving system that allows rainfall to infiltrate into an underlying aggregate storage reservoir, where stormwater is stored and infiltrated to the underlying subgrade or (for larger storms for which it cannot infiltrate) removed by an overflow drainage system (such a perforated pipe) that discharges into the drainage system. Permeable pavement consists of a wearing course (e.g., porous asphalt, pervious concrete) and an underlying aggregate storage reservoir/subbase, which is designed to temporarily store water and provide structural support for intended loads. Facilities that are pollution-generating (road or alley) or receive runoff from pollution-generating surfaces also can provide “basic” water quality if the underlying subgrade soils meet the water quality treatment requirements. Otherwise, a treatment layer within the pavement section is required. See City of Seattle Stormwater Manual Volume 3, Section 5.4.6.

Permeable Pavement Surfaces:

Permeable pavement surfaces are like permeable pavement facilities, but are not considered infiltration facilities, cannot be designed to manage run-on, and have different design requirements. See COS Stormwater Manual, Volume 3, Section 5.6.2.

Rain Garden:

Rain gardens are non-engineered, shallow landscape depressions with compost-amended native soils and adapted plants that pond and temporarily store stormwater runoff from adjacent areas. A rain garden is not defined as a water quality treatment or flow control facility as described in the COS Stormwater Manual, Volume 3, Section 5.4.5, or Washington State Department of Ecology’s Stormwater Management Manual for Western Washington. A rain garden is typically a small-scale or singular facility. A rain garden may be used to manage runoff from new sidewalks to meet “On-Site Stormwater Management” requirements described in COS Stormwater Manual and SPU’s Client Assistance Memo (CAM) 1190.

Road:

The road or roadway means that portion of a street improved, designed, or ordinarily used for vehicular travel and parking, exclusive of the sidewalk or shoulder. Where there are curbs, the roadway is the curb-to-curb width of the street.

Street:

A public right-of-way that includes a roadway, shoulder, planting strips and/or sidewalk(s) along other public infrastructure and utilities. See Glossary in Streets Illustrated for full definition. See also “road.” “Travelled way” refers to just the portion of the street that receives vehicular traffic.

Site:

A site refers to a block or group of blocks being evaluated for Options Analysis.

Street Typology:

Refers to Street Type as defined in Streets Illustrated, Seattle’s Right-of-Way Improvements Manual. The Design manual includes specific design requirements for Neighborhood Yield and Neighborhood Curbless streets.

Definitions

See Glossary in Streets Illustrated for full definitions of Road, Street, and Street Typology. For the purposes of this manual, use “street” when referring to the full right-of-way or elements within the right-of-way; use “road” when being specific regarding the vehicular surface area. The roadway might have a curb along the road edge. “Travelled way” refers to just the portion of the street that receives vehicular traffic.

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Section 1

Introduction

1.1 Overview

Seattle Public Utilities (SPU) has been at the forefront of Green Stormwater Infrastructure (GSI) with public installations since as early as 1999. The early projects established the basis for interdisciplinary and interdepartmental teamwork necessary for success in the urban context. Over the years the City of Seattle (City) has actively participated in the national forum to share ideas and practices and to encourage broader applications for GSI. As their multi-functional values became apparent, GSI techniques have become a baseline code requirement under the City's National Pollution Discharge Elimination System Permit (NPDES) with Washington State Department of Ecology, as described in "on-site stormwater management" in Ecology's Stormwater Management Manual for Western Washington (December 2014). GSI techniques include soil amendments, tree retention, roadside bioretention and permeable pavement. For right-of-way retrofits, bioretention facilities are now a formal utility infrastructure like stormwater pipes and structures. In addition to meeting Ecology permit(s) and other regulatory requirements, use of GSI techniques supports SPU's and King County Wastewater Treatment Division's (WTD) strategy of solving problems at the source.

Roadside bioretention facilities have been installed for stormwater code compliance, creek basin projects, combined sewer overflow control projects, and capital retrofit projects. Like a forest, bioretention facilities filter out pollution and help rain soak into the ground rather than rush over yards, parking lots, and streets, thereby washing pollutants into the regions' living waterways (e.g., rivers, lakes, creeks, streams, ponds, and sea). Seattle has prioritized the use of GSI (specifically bioretention facilities) where feasible because it is effective, cost-comparable with conventional approaches, and can provide additional value or co-benefits; in addition to preventing water pollution, bioretention facilities can beautify neighborhoods, provide access to nature, calm traffic, improve pedestrian safety, and capture rain for reuse. GSI is a community-centered utility solution that helps make Seattle a sustainable and resilient city.

GSI Techniques in Right of Way (ROW)

This volume is focused on bioretention facilities that manage road runoff and provide flow attenuation and water quality treatment. For other GSI technologies, see the COS Stormwater Manual, Streets Illustrated (ROWIM), COS Standard Plans and COS Standard Specifications. Design guidance for rain gardens for sidewalk mitigation is described in SPU Client Assistance Memo

1.2 Purpose

The purpose of the GSI Manual is to provide technical design guidance and standard procedures from a project's initiation through Operations and Maintenance. This manual is structured for use by SPU and WTD staff on capital improvement projects (CIP) that implement GSI technologies along streets in the City ROW. The end users of this manual might include SPU, WTD, and their design consultants.

The GSI Manual comprises five volumes, one for each phase of a project.

Volume I: Project Initiation Flowchart
Volume II: Options Analysis
Volume III: Design Phase
Volume IV: Construction, On-Boarding & Commissioning
Volume V: Operations & Maintenance

This volume covers SPU's Options Analysis (OA) and WTD's Alternative Analysis (AA) phases. Consult with other volumes for additional information and guidelines for SPU/WTD GSI CIPs.

The intent of **Volume II: Options Analysis** of the GSI Manual is to provide an evaluation framework based on multi-disciplinary considerations for feasibility, performance, cost, partnering opportunities, public engagement, and co-benefits to determine which GSI technologies should be deployed where, in order to best meet project goals. This manual is based on historic GSI projects built in the City and considers lessons learned, as well as tools and methodologies that can be customized to meet project-specific needs. The GSI technologies described in this volume primarily focus on various configurations of bioretention facilities and briefly address permeable pavements. Non-bioretention GSI technologies, such as engineered wetlands, vegetated roofs, and cisterns, can use many of the same principles discussed in this manual for OA/AA but may only be used with specific agency approval.

- For WTD-led projects, the performance target is to use GSI and other technologies to reduce combined sewer overflow (CSO) events in combined sewer basins where the overflow is managed by WTD.
- For SPU-led projects, the performance target will vary depending upon the basin. Bioretention facilities and associated infrastructure may be used for providing creek protection, water quality treatment, flood control, flow mitigation, CSO control and/or other citywide stormwater performance targets, along with community streetscape and habitat enhancements.

1.3 How to Use this Volume of the GSI Manual

The GSI Manual supplements, but does not replace, City and County standard and design guidelines and manuals to further address capital improvement projects, such as retrofits, that may include goals outside of the stormwater code requirements. It does not replace these standards. See each agency's standard requirements for OA and AA phases for CIPs.

TIPS

Key points and tips are called out in blue boxes throughout the document.

Once the Project Team is selected for SPU's OA/WTD's AA phases, the Project Manager, Line of Business Representative (SPU), Project Engineer, lead designers (Landscape Architect and Civil Engineer), and Public Engagement Lead should read the entirety of this volume and GSI Manual, Volume III: Design Phase to familiarize themselves with guidance and requirements. See Section 1.5 for an overview of the OA/AA framework. The Project Team should discuss with the SPU/WTD Project Manager the approach to multidisciplinary integration and collaboration, and to establish expectations for outcomes during scoping. This volume should be available to the designers, subject matter experts and other agency staff on the Project Team for this phase of the project.

The planning, feasibility assessment, OA/AA and design of GSI techniques (roadside bioretention and/or permeable pavement alleys) in the public ROW requires an integrated multidisciplinary team of outreach professionals, modelers, maintenance staff, landscape architects, civil engineers, geotechnical engineers and hydrogeologists. To assess feasibility during OA/AA, the Project Team needs to understand design and construction of GSI. The design of GSI includes both technical analysis (e.g., subsurface soil conditions, available space for treatment, and topography) and other project-specific factors, including site and community context, mobility and access, and long-term operations and maintenance. For more information on design of GSI in the City's ROW, see GSI Manual, Volume III: Design Phase.

Definitions & Abbreviations

Definitions and descriptions for GSI technologies are described in the City of Seattle Stormwater Manual.

Definitions and descriptions for street typologies and other ROW elements are described in Seattle Streets Illustrated, the Right-of-Way Improvements Manual.

A list of acronyms used in this volume is included after this volume's Table of Contents.

1.4 SPU and WTD Stage Gates and Terminology

SPU and WTD provide oversight of their CIP delivery processes using "stage gate" systems in which agency management reviews a project's scope, schedule, budget and risk at important milestones and provides approval to advance to the next project phase. These systems are similar but include agency-specific terminology and processes. This phase of review of alternative concepts or options is called Options Analysis (OA) for SPU and Alternative Analysis

(AA) for WTD. For simplicity, this volume of the GSI Manual uses the term Options Analysis and distinguishes between SPU and WTD processes and terminology as needed. Figure 1 illustrates an overlay between the two agencies' stage gate processes and how they relate to the GSI Manual.

- For SPU-led CIP, OA begins after Project Initiation and at SPU's Stage Gate 1.
- For WTD-led CIP, AA begins after a Project Charter and Problem Definition at WTD's Stage Gate 1.

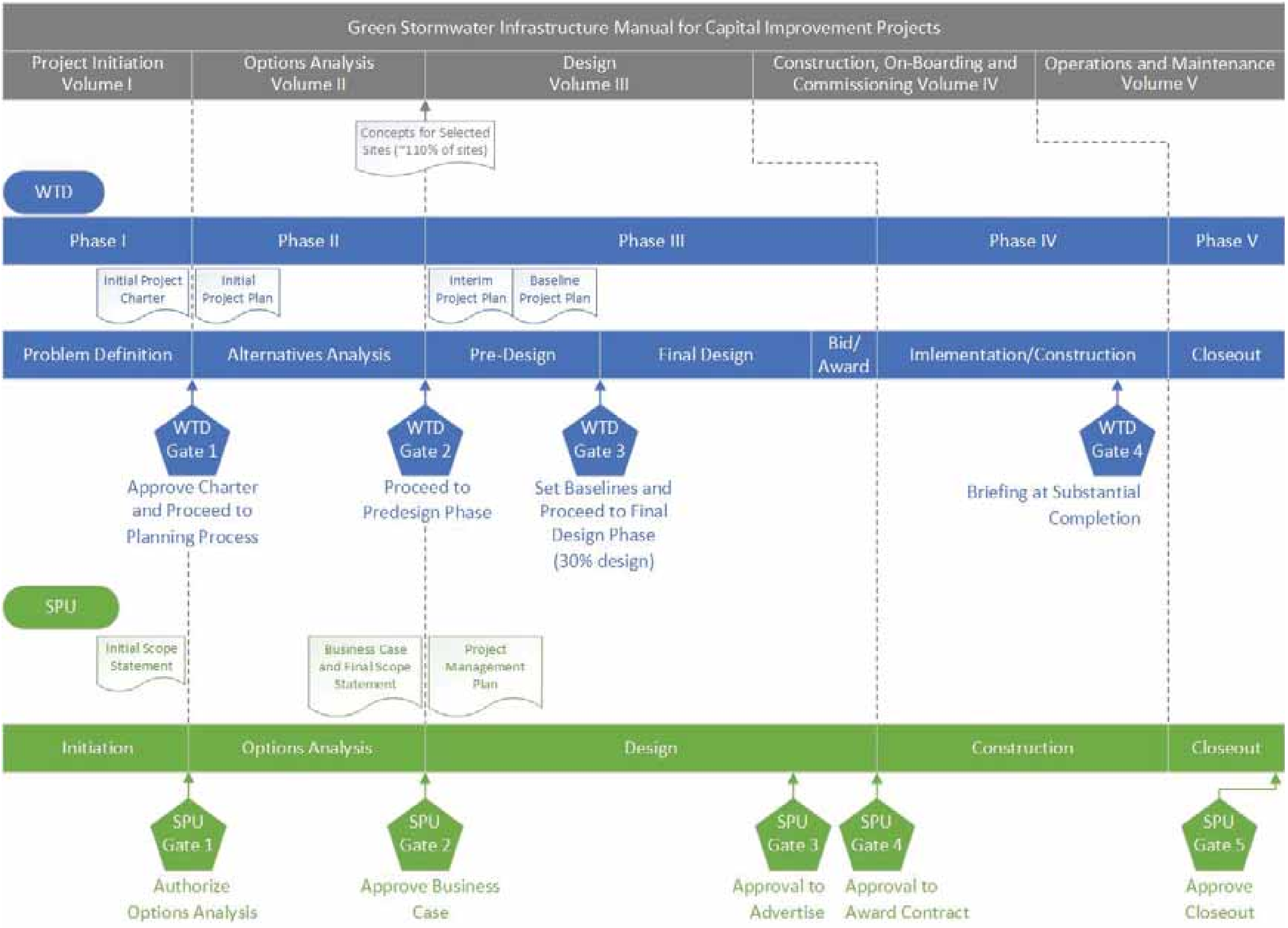

Figure 1 SPU/WTD Stage Gate Systems

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1.5 Stages of Options Analysis

The work done during OA builds upon existing knowledge to evaluate options for meeting project objectives. Accordingly, this volume covers activities under SPU's OA and WTD's AA phases for evaluating GSI retrofit options (both in location and technology) for a project and recommending a preferred option. The general OA process is described in Chapter 1 of SPU's Design Standards and Guidelines (available at the following link http://www.seattle.gov/utilities/construction-and-development/design-standards). For simplicity, this project phase is referred to as the Options Analysis Phase in this volume.

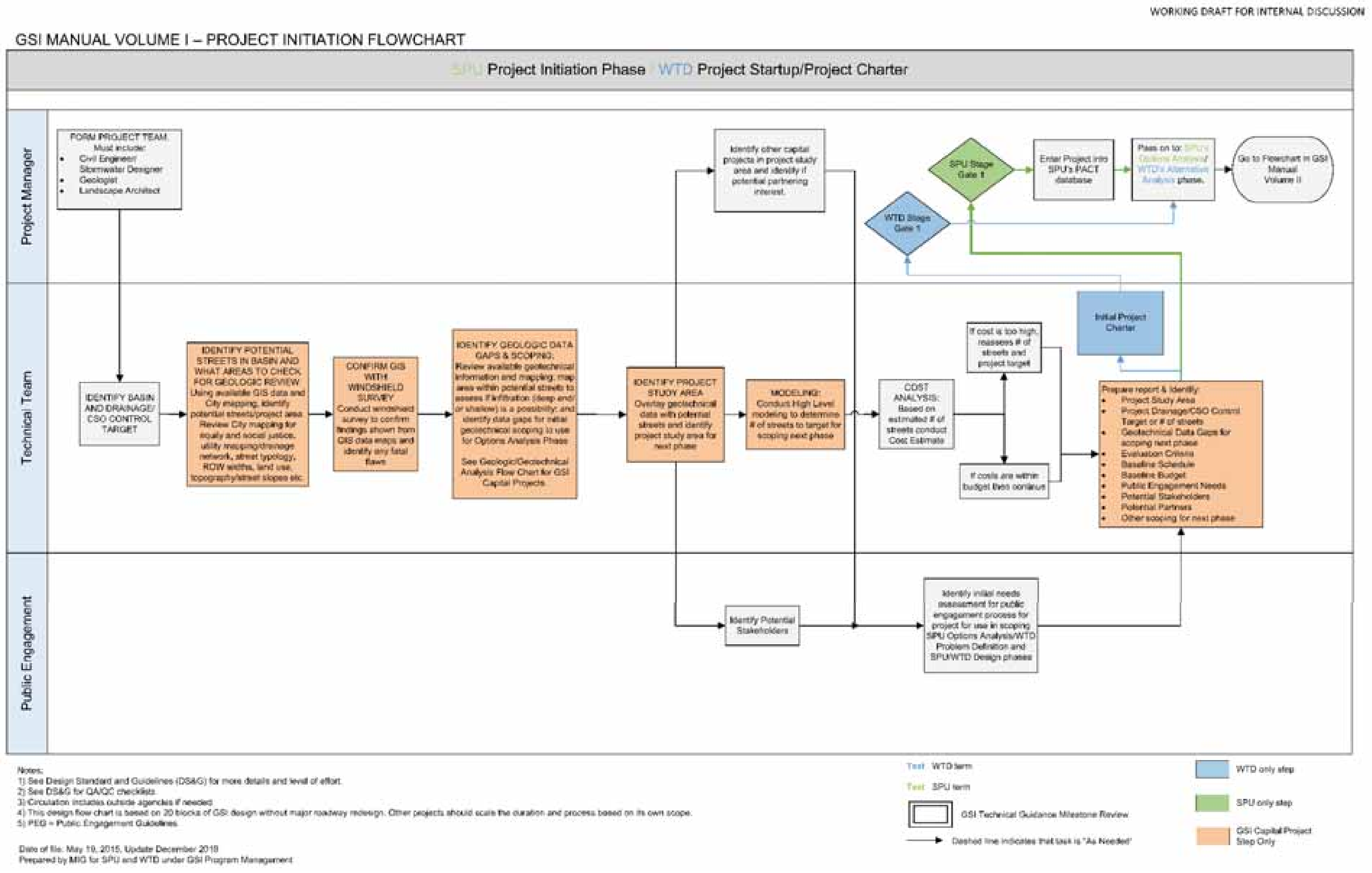
1.5.1 Work Completed Prior to Start of Options Analysis

At the completion of SPU's Project Initiation Phase, it is assumed that the following information has been identified prior to the start of OA. See Figure 2 for GSI Manual Volume I – Project Initiation Flow Chart for additional information.

- Project study area
- Project drainage/CSO control target or number of streets
- Geologic data review for scoping next phase
- Initial schedule
- Initial budget
- Public engagement needs
- Potential stakeholders
- Potential partners
- Potential evaluation criteria
- Other scoping for next phase

For SPU-led CIPs, it is assumed that through the above steps, the project business case has been established and a high-level feasibility analysis has been conducted to confirm the viability of GSI in a defined project area. If some of these tasks were not completed prior to the start of OA, then they would be done at the start of OA for initial screening of the project.

For WTD-led CIPs, prior to start of AA, a Project Charter and Problem Definition will have been developed and defined. Some of the elements noted for SPU's Project Initiation Phase may have been identified by WTD as part of developing the Project Charter. For example, the Project Charter may define the project goal to identify the most cost-effective GSI solution in a basin without an established project budget nor number of streets to target. As a result, a high-level feasibility analysis and study would be required at the start of AA.



Notes:
1) See Design Standard and Guidelines (DS&G) for more details and level of effort.
2) See DS&G for QA/QC checklists.
3) Circulation includes outside agencies if needed
4) This design flow chart is based on 20 blocks of GSI design without major roadway redesign. Other projects should scale the duration and process based on its own scope.
5) PEG = Public Engagement Guidelines.

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Prepared by MIG for SPU and WTD under GSI Program Management

Figure 2 GSI Manual Volume 1 – Project Initiation Flowchart

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1.5.2 Options Analysis Steps

While the specific sequencing of activities to complete OA for GSI CIPs varies by project and agency, there are similar OA steps for all projects. The guidance presented in this manual is organized based on the four steps of OA:

Understanding the Problem and Potential Solutions (Section 2): Form the Project Team and review project background and existing information to confirm all team members understand the project goals. Review available desktop information to identify potential solutions, site context and feasibility constraints in the project area.

Potential Sites (Section 3): Identify potential solutions by evaluating GSI feasibility in the field (often at individual block scale) by factoring site context, community input, geologic and geotechnical conditions, infrastructure and other factors. Select sites on which to develop concept designs.

Recommended Sites and Concepts (Section 4): Develop Concept Plans and documentation (e.g., data sheets) to evaluate and recommend the preferred option. This phase will also evaluate and develop SPU's Business Case for the preferred option.

Final Sites and Concepts (Section 5): Refine preferred alternative and documentation per input from management and project stakeholders and conduct Stage Gate 2 to obtain approval to proceed to the design phase.

The activities that inform each step of OA is described in more detail in each subsection. A general workflow demonstrating how information is developed by the Project Team and used to engage the public for input at each step is graphically represented in Figure 3.

Project goals and objectives should be reviewed and confirmed at every OA step to ensure that the project aligns with and is able to meet these goals. To facilitate these reviews, key work products are used to communicate within the project team and with the community. Table 1 summarizes the key work products anticipated for Options Analysis.

Options Analysis Steps | Project Team | Community

Understanding the Problem and Potential Solutions

Project Team Start-up, Management and Coordination

- SPU's Initial Scope Statement / WTD's Initial Project Charter
- Project Team for Options Analysis
- Project Management Plan/ Initial Project Plan

Project Team:

- Evaluate Potential Partners or Co-Siting Opportunities
- Apply and Evaluate Equity and Social Justice
- Public Engagement Plan Development
- Geotechnical/Hydrogeologic Analysis Approach
- Initial Design Parameters and Minimum Requirements

Community:

- Engage Community to Understand Problem(s) and Study Area
- Outreach for Field Work Notifications

Potentially Feasible Sites in Project Area

- Potentially Feasible Area Map

Project Team:

- Geologic Data Review
- Screening Level Geologic Evaluation[1]
- Desktop Feasibility Review
- Site Context and Social Function Review
- Identify Potential Partnerships Sites
- Stage 1 Geologic Exploration Plan

[1] *May have been complete during Initiation Phase. If not, critical path, field work needs to be complete between November and March.*

Potential Sites

Block-Scale Analysis (~200% of sites)

- Block-Scale Feasibility Maps
- Initial Site Selection Map

May require multiple iterations

Project Team:

- Confirm Evaluation Criteria for Site Selection
- Conduct Stage 1 Geologic Evaluation[1]
- Select Design Scenarios and Standard Details
- Site Reconnaissance for Options Analysis

Community:

- Outreach for Potential Sites

Site Selection for Concept Design (~120% of sites)

- Revised Site Selection Map

Project Team:

- Confirm Potential Partnership Sites
- Cultural Resources Review for SEPA
- Revise Initial Site Ratings
- Update Project Risk Register
- Stage 2 Exploration Plan

[1] *Critical path needs to be between November and March*

Recommended Sites and Concepts

Develop Concept Designs for Options Development

- Concept Plans and Data Documentation
- Revised Site Selection Map

Project Team:

- Conduct Stage 2 Geologic Evaluation[1]
- Define Options
- Confirm Evaluation Criteria for Option Selection
- Hydrogeological/Geotechnical Design Parameters
- Basis of Design for Concepts
- Interdepartmental Review

Community:

- Outreach for Refinement of Potential Sites

Develop, Evaluate, and Recommend Preferred Option

- Management Briefing

Project Team:

- Evaluate and Recommend Preferred Option

[1] *Critical path, field work needs to be between November and March*

Final Sites and Concepts

Select Preferred Option (~110% of sites)

- Final Site Selection Map
- Stage Gate 2

Project Team:

- Preferred Option Refinement
- Partnership Agreement
- Public Engagement Report for Options Analysis

Community:

- Inform neighborhood about site selection

Closeout of Options Analysis Phase

Project Team:

- Project Report for Options Analysis

Figure 3 Options Analysis Overview

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Table 1 Summary of Key Work Products

Work Product Name	Description	Relevant Section	Sample
Project Overview and Study Area for Outreach	Community outreach for the project study area to describe the problem and map of the study area	Section 2.2	Appendix B
Potentially Feasible Area Map	A high-level screening via a desktop study and available mapping to redefine the study area.	Section 2.2.6 Potentially Feasible Area Map	Appendix E
Block-Scale Feasibility Map	Consideration for block-specific data (such as major utilities, bike paths/greenways, existing trees, private improvements in ROW) to identify and/or rate feasible areas for GSI along a particular block.	Section 3.1.5 Block-Scale Feasibility Maps	Appendix G
Potential Sites Map for Outreach	Plan showing feasible areas identified for the solution concept. Board with images, photos, or sketches depicting general concept of solution.	Section 3.2	Appendix B
Site Selection Map	Project-area map showing sites selected for further development. Map may be updated for each level of analysis (such as which sites will develop concept designs and which sites will move forward to the design phase).	Sections 3.1.6, 3.2.5, 4.1.7, 5.1.3 Site Selection Maps	Appendix H
Concept Data Documentation	Project-specific form for documenting relevant information on each site used to evaluate and compare options in preparation for SPU's Business Case/WTD's preferred alternative.	Section 4.1.5 Basis of Design for Concepts	Appendix K
Concept Plans	Plan to demonstrate how the proposed BMP and its associated infrastructure fits along a block. Must include enough detail to develop planning level cost estimate.	Section 4.1.6 Concept Plans and Documentation	Appendix L
Project Report	Includes basis of design and basis of estimate, and documents the OA process and work done to date	Section 5.2.1 Project Report for Options Analysis	Appendix C in Design Volume

1.5.3 Work to be Complete During OA Phase

At a minimum, the following should be completed during the Options Analysis Phase:

- Administrative and regulatory steps:
    - Develop the Business Case and Final Scope Statement (SPU) or initial project plan (WTD).
    - Identify partnership opportunities and memoranda of agreements or understanding (MOA/MOU) required with other agencies, private developers, utility purveyors, and/or organizations.
    - Evaluate permitting requirements and complete steps recommended based on project needs. See Appendix M for potentially applicable permit and compliance triggers. For example:
        - Conduct early design guidance to initiate SIP process (for non-SDOT partnership projects)
        - Initiate review with SDOT Deviations Committee for any deviations from Streets Illustrated
        - Conduct a cultural resources review for State Environmental Policy Act (SEPA) at locations considered to be higher risk
    - Initiate Do No Harm requirements (standards under development at the time of publication)
    - Complete documentation required to advance through Stage Gate 2.
- Preliminary design concepts for streets selected for retrofit:
    - Conduct site reconnaissance and assessment to characterize existing street context conditions to inform about feasible areas for siting facilities and associated infrastructure. At least one round of site visits should be performed during the wet season, from October to March, to observe drainage patterns and issues.
    - Produce preliminary conceptual layout of bioretention cells along a street (along with street cross-section with bioretention cell sections), including but not limited to tributary area, initial sizing/performance, and/or associated downstream improvements.
    - Conduct geotechnical investigations and groundwater monitoring to determine method of discharge (shallow, deep infiltration, or discharge back into the public drainage system), as well as methods of mitigating or avoiding geotechnical impacts (e.g., liners and steep slope setbacks).
    - Identify stormwater code requirements and determine how they will be addressed on the project. For example, if flow control is triggered, document that along with how it will be addressed (on the project, alternative compliance, etc.)

- Produce preliminary conceptual layout of other GSI and non-GSI technologies/BMPs (if part of the project's solution) within the streetscape from both plan and cross-section perspectives.
- Produce preliminary conceptual layout of other major improvements, such as a new sidewalk or road alignment, if the project is a partnership with Seattle Department of Transportation (SDOT) or another entity.
- Engage community to inform on the study area, field testing, potential sites with feasible areas, and potential solutions being evaluated.
- Evaluate sites selected and their associated concepts based on the criteria set forth by SPU/WTD.
- Complete a Project Report documenting the analysis (e.g., field reconnaissance, soil testing and investigations, pre-sizing/modeling, Concept Plans/cross-sections, community outreach, cost estimates, and evaluation criteria) completed for the stages of Options Analysis (See GSI Manual, Volume III: Design Phase, Appendix C for a report template).
- Identify property acquisition needs
- Identify monitoring requirements

At the end of the Options Analysis Phase, enough analysis will have been conducted to determine the sites and conceptual location of GSI technologies and associated infrastructure on each street. This forms the basis of SPU's Business Case/WTD's preferred alternative. Upon Stage Gate 2 approval, the project then moves to the design phase (GSI Manual, Volume III, Section 1.6). The project should select 110% of sites needed to meet performance goals before moving into the design phase. This "buffer" of sites is to account for unknown constraints that may render a street infeasible during the design phase.

Terminology

The term "sites" in this manual typically refers to a street selected for retrofit with GSI.

Project-Specific Considerations

The level of analysis and sequencing of activities to meet these minimum requirements depends on the project's goals, scale and complexity. CIPs with GSI will vary based on project targets, scale, GSI BMP types, and scope; thus, some projects are more complex than others. For example, SPU's natural drainage system (NDS) Partnering projects in Thornton Creek and Longfellow Creek watersheds narrowed down selection of potential streets to retrofit with GSI early on, based on the projects' focus on providing water quality treatment using roadside bioretention with underdrains along mostly Neighborhood Yield streets. By contrast, a project targeting to reduce stormwater flows into the combined sewer to the maximum extent practicable may have a larger study area, comparing multiple stormwater treatment and infiltration types.

This volume provides guidance and standard tools and techniques for these requirements and includes suggestions for how to adjust to project-specific needs based on lessons learned from past GSI projects.

1.6 Resources

To inform the Options Analysis phase, relevant policies and standards for designing GSI retrofits in the City ROW should be identified early. Seattle Streets Illustrated, the Right-of-Way Improvements Manual (ROWIM), and City master plans should be reviewed for identifying street typology and potential partnering opportunities, as well as coordination of future improvements. The following documents and policies should inform the potential concepts and options.

Relevant policies and standards:

- GSI Manual, Volume III: Design Phase
- City of Seattle Stormwater Manual (current edition available at: http://www.seattle.gov/sdci/codes/codes-we-enforce-(a-z)/stormwater-code)
- City of Seattle Standard Plans and Standard Specifications (available at: http://www.seattle.gov/utilities/construction-and-development/standard-specs-plans)
- Seattle Public Utilities Design Standards and Guidelines (DSG) (available at: http://www.seattle.gov/utilities/construction-and-development/design-standards)
- Right-of-Way Improvements Manual – Seattle Streets Illustrated (available at: https://streetsillustrated.seattle.gov/)
- Other Seattle Department of Transportation Manuals such as Street Tree Manual, Traffic Control Manual, and Right-of-way Opening and Restoration Rules (available at: http://www.seattle.gov/transportation/sdot-document-library/manuals)
- SPU Project Management Methodologies (available by request)
- WTD Project Management Manual (available by request)
- Other (see GSI Design Manual, Volume III, Section 1.5 for additional resources)

Relevant current editions of City master plans

- Arterial Asphalt and Concrete (AAC) Paving Plan
- Seattle Bicycle Master Plan
- Seattle Pedestrian Master Plan
- Transit Master Plan
- Freight Master Plan
- Urban Forest Stewardship Plan
- Neighborhood and community plans
- Other (See GSI Design Manual, Volume III, Section 1.5 for additional resources)

See Section 2.1.4 for additional resources for coordination.

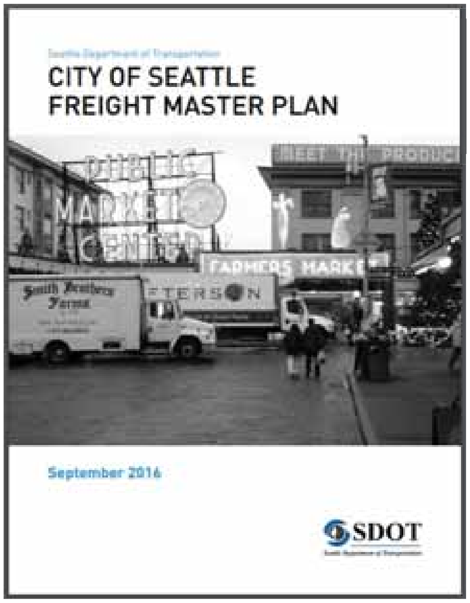
Image: Pedestrian master plan

CITY OF SEATTLE
PEDESTRIAN MASTER PLAN

June 2017

Seattle Department of Transportation

Image: Freight master plan

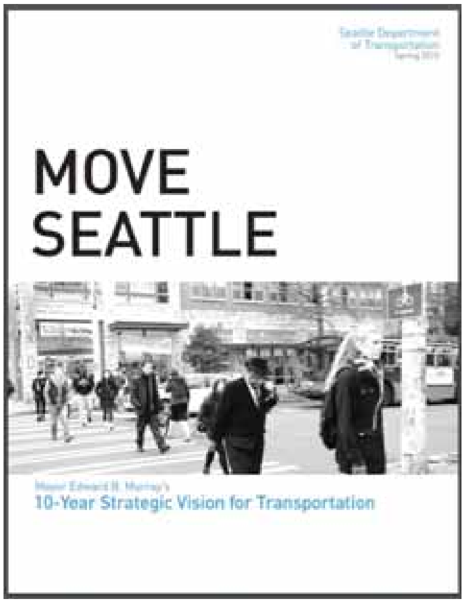


CITY OF SEATTLE
FREIGHT MASTER PLAN

September 2016

SDOT

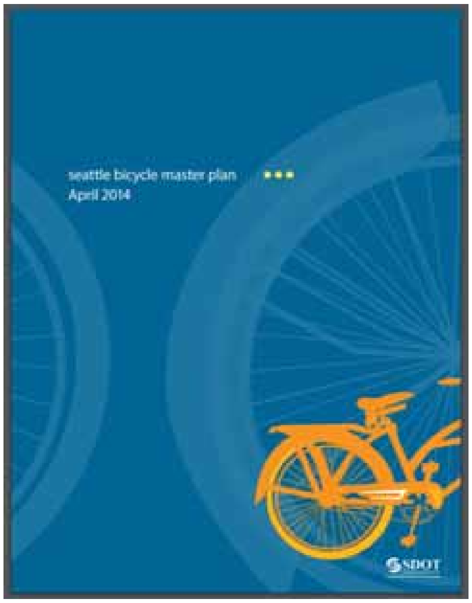
Image: Transit master plan



MOVE
SEATTLE

10-Year Strategic Vision for Transportation

Image: Bicycle master plan



seattle bicycle master plan
April 2014

SDOT

Section 2

Understanding the Problem and Potential Solutions

Goals, purpose statements and performance targets of CIPs will vary from basin to basin and from project to project. Projects may have been initiated for OA to address problems of localized flooding or nuisance ponding; to provide water quality treatment for stormwater in creek basins; to reduce peak flows into receiving water and channel protection; to intercept stormwater from entering the combined sewer system (CSS) to reduce CSO events and control volume; to address Stormwater Code requirements for redevelopment of a City street; and for other purposes as part of the City's capital improvement plans. The type of problem, the performance target, and the goals, along with other City priorities and desired co-benefits of the CIP, will largely determine which GSI strategies are feasible and which characteristics to look for in evaluating streets for feasibility. The subsections below describe the process for starting the Options Analysis Phase; it begins with understanding the problem and identifying potential solutions that inform how to assess sites (streets) for feasibility in the project study area.

Figure 4 provides an overview for the activities related to this step of OA. Each activity is described in more detail below.

Figure 4 Understanding the Problem and Potential Solutions

2.1 Project Team Start-up, Management and Coordination

To kick off OA, the Project Team shall hold a meeting to review the project background and goals to develop plans for managing and coordinating efforts. The general workflow consists of the SPU's Initial Scope Statement/WTD's Initial Project Charter, formation of the Project Team, development of Project Management Plan with a Public Engagement Plan; evaluating potential partners; and a Geotechnical Exploration and Study Plan.

2.1.1 SPU's Initial Scope Statement/WTD's Initial Project Charter

Objective: Clearly define scope of project, evaluation criteria, options for consideration and critical stakeholders as authorized via management approval of Stage Gate 1

Stage Gate 1 refers to the decision point at which the project has been initiated and approved for OA. It is assumed that the project has proceeded through the necessary requirements for writing, reviewing, and obtaining approval for SPU's and WTD's Stage Gate 1 as described in GSI Manual, Volume I. If the project still needs to go through the approval process, then an Initial Scope Statement (SPU)/Initial Project Charter (WTD) must be developed per each agency's standard protocols (SPU Project Management Methodologies/WTD Project Management Manual). Examples of Initial Scope Statement and/or Design Guidance and Project Charters are available from SPU and WTD staff.

SPU Initial Scope Statement

For GSI projects, include consideration for Design Commissioning and 1% for art potential. Information for the Seattle Design Commission is available at the following link: http://www.seattle.gov/designcommission/project-reviews/project-handbook#overview

2.1.2 Project Team for Options Analysis

Objective: Form a Project Team for effective execution of Options Analysis; provide clarity on roles and responsibilities and endorse the goals, objectives and evaluation criteria as described in the Initial Scope Statement and Initial Project Charter

A multidisciplinary analysis and integrated design are required for GSI implementation to be successful because GSI is a surface infrastructure that can affect the social function/use of the right-of-way while also performing a stormwater function. The Project Team for the Options Analysis Phase may be composed solely of SPU or WTD staff, and it may include consultants.

Public Engagement Lead

In this volume, the term for Public Engagement Lead is used to represent both SPU's Public Engagement Lead and WTD's Community Services Group Representative.

<u>For SPU GSI CIPs, the Project Team should include:</u>

- Project Manager
- Project Engineer

- Line of Business Representative
- Asset Manager
- Partner agency, e.g., SDOT representatives, if applicable
- Public Engagement Lead
- Hydrogeologic/Geotechnical Engineer
- Hydrogeologist
- Design Engineer
- Landscape Architect
- Environmental Justice and Service Equity Representative

One person from the Project Team will be responsible for overseeing the commissioning and asset onboarding tasks required during Options Analysis Phase in accordance with SPU requirements (see SPU commissioning guidelines, available to SPU staff). See also GSI Manual, Volume IV for Commissioning guidelines.

For WTD CIPs, the Project Team should include:

- Project Manager
- Operations & Maintenance Representative
- Partner agency, e.g., SDOT representatives, if applicable*
- Community Services Group Representative
- Hydrogeologic/Geotechnical Engineer
- Hydrogeologist
- Civil Engineer
- Landscape Architect

*It is also recommended that WTD's Project Manager inform the SPU GSI Projects Program Manager about the project for coordination with SDOT.

Design Consultant Procurement

If the project includes a design consultant team, procurement, selection, scoping, and contracting should be carried out in accordance with each agency's processes. City of Seattle Purchasing and Contracting Services provides policies, processes, and guidance. WTD procurement information is available online (http://www.kingcounty.gov/operations/procurement.aspx). At the time of this update, any significant consultant services for SPU requires a lead time of six to 15 months.

2.1.3 Project Management Plan/Initial Project Plan

Objective: Communicate and endorse project goals, and establish an initial scope, schedule, and budget and protocols for delivering the Options Analysis Phase.

The Project Team will be described in detail in a work plan — Options Analysis portion of Project Management Plan (PMP) for SPU or Initial Project Plan for WTD — and will be initiated into the project through a chartering meeting to align project roles, assign responsibilities, state goals, and identify risks and procedures. The project kick-off should include distribution and discussion of the Initial Scope Statement for SPU-led projects and the Initial Project Charter for WTD-led projects, the agencies' goals and desired outcomes for the project, and agencies' design parameters and criteria. The entire team should be present for this discussion, including consultants (if applicable), as well as agency discipline leads and project managers.

For SPU-led CIPs, a portion of the PMP should be developed during Options Analysis, including the Initial Scope Statement and Roles and Responsibilities. These portions should be finalized prior to Stage Gate 2; baseline documents should be finalized after 30% design and should follow the project management methodology available to SPU staff (http://spuforms). Samples of final PMPs from past GSI projects (such as SPU's Ballard Phase 2 and NDS Partnering projects for Thornton and Longfellow creeks) are available from SPU staff.

For WTD-led CIPs, an Initial Project Charter should be developed during Problem Definition and forms the basis of the Initial Project Plan. The Initial Project Plan is then revised after Stage Gate 2 and will follow the County's project management methodology. Examples of WTD documentation are available from WTD staff.

Project-Specific Considerations

Schedule and level of effort are heavily influenced by a project's scope. The level of effort is a product of the project's goals, the BMPs being considered, input from community stakeholders, the scale of the project, and other City/County goals for the CIP. Ultimately, the Options Analysis Phase is an iterative process that narrows in on what BMPs should be designed and constructed — and where — to best meet the project goals. For example, a project with a large study area (i.e., more than 1,000 acres) involving evaluation of multiple BMPs (bioretention, permeable pavement, and proprietary stormwater facilities, with shallow-versus-deep technologies for infiltrating stormwater) would require a step-wise analysis to initially screen sites and BMPs; it would also require higher level feasibility and siting analysis with less detailed data for individual sites to streamline level of effort. Whereas, a project with a smaller or predefined site location (such as SPU's Delridge NDS or Venema projects) and targeted BMP type (such as bioretention cells with deep infiltration) may have limited early desktop analysis, followed by more detailed site-scale feasibility analysis and concept design. This streamlines the schedule and reduces risk.

2.1.4 Evaluate Potential Partners or Co-Siting Opportunities

Objective: Identify opportunities to coordinate with other agencies and ROW projects in the area to maximize cost-efficient, multi-benefit opportunities through partnerships and/or avoid potential conflicts.

Partnership Approaches

Project-specific partnership approaches (e.g., actively seeking partners vs. passively considering partnerships if approached) may have a significant effect on option development and street selection.

If a partner is identified, the Project Team should consider impacts of the partnership on scope, schedule, and budget.

Partnerships with other agencies and ROW projects can provide opportunity to develop cost-efficient solutions beneficial to both parties while reducing construction impacts on the affected community. Coordination with other agencies and ROW projects in the project area is also important for avoiding potential conflicts. The Project Team should review SDOT's Project and Construction Coordination Map (dotMaps application) for current and future construction projects in the ROW and other events that may impact traffic in the project area. Project-specific partnerships may take a variety of forms, such as SPU/KC-led partnerships, outside-agency-led partnerships, and public/private partnerships. There might also be various approaches to developing those relationships. The Project Team should identify any potential partnerships for work within the project study area and include in the PMP or chartering documents a plan for developing partnerships. These documents should describe the goals for and approach to partnering opportunities.

Ideas for identifying partnership potential include:

- SPU groups, including:
  - Pipe rehab
  - GSI Partnership and Urban Village programs
  - Capacity Management, Operations, and Maintenance (CMOM) program
  - CSO staff and projects
  - Localized flooding group
  - Modelling group
  - Planning group
  - Code and regulatory group
  - Project Delivery and Execution Branch (PDEB) various divisions depending on project
  - Operations and maintenance (O&M)
  - System Operations Planning and Analysis (SOPA) group
  - Solid Waste Line of Business, if relevant
- Existing MOAs or MOUs

- SDOT Project and Construction Coordination Map for any current or future City capital projects, also referred to as the dotMaps application (available online here: http://www.seattle.gov/transportation/projects-and-programs/programs/project-and-construction-coordination-office/project-and-construction-coordination-map)
- City master plans for potential future capital projects (see Section 1.6 for list of city-wide plans)
- SDOT Safe Routes to School
- Neighborhood and community plans for potential future capital projects (e.g., Your Voice Your Choice, Neighborhood Greenways)
- Utility purveyors for coordinating utility upgrades and street restoration (both public and franchise utilities)
- SPU Water Line of Business for opportunistic water main or water service work and/or conflicts
- ROWIM for streets noted under the Pedestrian Master Plan as a Priority Investment Network because of lack of sidewalks in the street ROW
- Seattle Department of Construction & Inspections (SDCI) Preliminary Assessment Report (PAR) database

For SPU NDS projects, contact SDOT counterparts to ascertain whether there are collaborative opportunities for sidewalk and other City improvements. As additional detail is developed throughout Options Analysis, the Project Manager should maintain coordination with partners (where applicable) so that street selection and project scheduling are aligned; co-benefits of partner projects are integrated; and messaging to the public is consistent.

See Appendix A for guidance on developing SPU-SDOT partnerships.

Project-Specific Considerations

The SPU NDS Partnership Program is an active program that identifies potential partnerships and specifically evaluates site-scale GSI feasibility where these opportunities are identified. For example, for SPU's Longfellow NDS project, SPU is partnering with SDOT to build sidewalks along a four-block corridor that the City designated as priority investment network because of lack of sidewalks.

Other projects might have a fixed project site, but the team can explore potential partnerships during OA.

Not all projects will rely on partnerships.

2.1.5 Apply and Evaluate Equity and Social Justice

Objective: Identify race or socioeconomic disparities or unintended impacts of the project to develop an inclusive outreach and public engagement plan.

As with all City-led CIPs, the Project Team shall identify potential equity and social justice impacts within the project study area for GSI. They shall use SPU's *Equity Planning Guide for Early Design* or Stage 3 of King County's Equity Impact Tool (both available from agency staff). The result of this effort, as well as the results of the demographic analysis conducted during Project Initiation, will inform development of specific strategies to engage historically underserved populations. The team should coordinate this effort with the Block-Scale Analysis and Site Selection for Concept Design (Section 3.1 and 3.2) to understand how the potential GSI design and associated infrastructure may affect the community and social function of the City ROW (see GSI Manual, Volume III – Design Phase for discussion on site context and social function considerations). The team should also consider this information during site selection and siting, and carry it through the design phase of the project. For example, for Options Analysis consider including a criterion for measuring equity to evaluate Site Selection (Section 3.1.1) and/or the Option Selection (Section 4.1.3) to integrate this information into decision-making and option evaluation. Other approaches to evaluating equity include reviewing Census data and engaging key stakeholder and community groups early in the planning process.

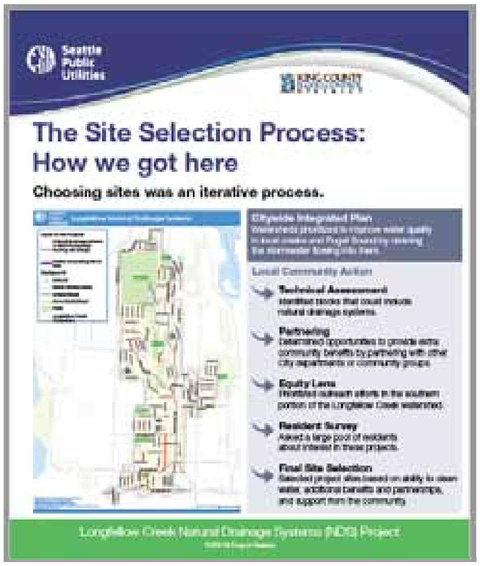
[Placeholder note: equity and social justice approach for GSI capital improvement projects is currently under development and may change from how it is described in this manual]

2.1.6 Public Engagement Plan Development

Objective: Develop a plan for engaging the public towards key goals and objectives.

At the start of Options Analysis, SPU's Public Engagement Lead/WTD's Community Services Group Representative, in coordination with others on the Project Team, should develop a Public Engagement Plan (PEP). The PEP will outline:

- Goals and objectives
- Key messages
- Opportunities for public input
- Audiences/stakeholders
- Outreach risks and challenges
- Tools and tactics
- Materials
- Schedule


Seattle Public Utilities

The Site Selection Process:
How we got here

Choosing sites was an iterative process.

Citywide Integrated Plan

Local Community Action

Technical Assessment

Partnering

Equity Lens

Resident Survey

Final Site Selection

Longfellow Creek Natural Drainage Systems (NDS) Project

Image: Sample outreach materials

Figure 4 should guide how a team considers their engagement goals.

The PEP is the Project Team's guide to implementing all outreach activities. The Public Engagement Lead will update the PEP at each OA step or as the team learns new information about the community or project impacts.

Resources for Developing PEP

The Project Team should review the following documents prior to developing the PEP:

- Information gathered from Project Initiation Phase, including identification of potential stakeholders and partners, and the initial needs assessment for public engagement
- Past community outreach conducted during site evaluation or for other projects within the basin study area
- Past or current engagement activities throughout the utility
- Summaries of outreach activities and public comments on Plan to Protect Seattle's Waterways
- SPU's *Communications and Public Engagement Guidelines, Sewer and Stormwater Pollution Prevention* (City of Seattle 2012). A copy of this document is provided in GSI Manual, Volume III – Design Phase.
- Seattle Office of Civil Rights' Inclusive Outreach and Public Engagement Guide (latest edition)
- WTD's Public Involvement Guidelines
- Resources for developing a PEP
- Sample Outreach Materials in Appendix B of this volume

What Are the Benefits?

- Greener, more attractive neighborhoods
- Lower risk of street flooding
- Additional natural habitat for native plants and animal species
- Healthier creek ecosystem
- Calmer traffic patterns
- More street trees

For more information, please contact:
Luis Ramirez
206.684.3660
Luis.Ramirez@seattle.gov

Image: Sample outreach materials

Key Areas for Outreach

On past GSI Projects, engagement activities have covered three primary areas during Options Analysis:

- Project goals, purpose and study area
- Field work
- Potential sites (feasible areas on streets) with potential solutions

Discussion of these three types is described in the individual sections of this volume.

Outreach Tools

Outreach tools should be tailored to the engagement objective and audience and established through the PEP process. Specific outreach tools may include, but are not limited to:

- Website
- Listserv announcements
- Interviews or advisory group
- Community briefings
- E-newsletters
- Flyers
- Project mailings
- Posters
- Door-to-door outreach
- One-on-one communications
- Open houses or workshops
- Online open houses
- Advertising
- Site tours
- Display boards
- Fact sheets
- FAQs (The joint GSI program has developed an FAQ template that can be tailored for each project’s needs. Contact SPU’s GSI Projects Program Manager for latest FAQ template. Examples of field work flyers are included in Appendix B.)
- Media relations
- Social media campaigns

Consistent Community Outreach Project Contact

For consistency with the public, the project contact should be the same throughout all phases of the project, if feasible. The designated contact person shall be listed in all materials and notifications. When other members of the Project Team are conducting field work, they should have on hand SPU/WTD contact information (e.g., business card of the designated Project Manager or WTD Community Services Group Representative) to hand out if a member of the public would like to find out more about the project.

- Attendance at community events
- Business cards

Specifics for outreach tools and activities that could occur during each stage of Options Analysis is described within the sections herein.

[Placeholder note: public engagement approach for GSI capital improvement projects is currently under development and may change from how it is described in this manual]

2.1.7 Geotechnical/Hydrogeologic Analysis Approach

Objective: Develop a project specific geotechnical/hydrogeologic analysis approach based on GSI Manual Flow Chart.

In general, the level of effort and methods associated with a Geotechnical/Hydrogeologic Analysis are dependent upon the desired infiltration techniques and overall project goals. For this reason, a prescriptive approach to a Geotechnical/Hydrogeologic Analysis should not be expected. The hydrogeologist or geotechnical lead should develop a project-specific approach for developing an exploration and testing plan. The staged approach for this plan is to be based on the project area and available data for the study area, as well as anticipated subsurface complexity in characterizing the groundwater, infiltration potential, geology, and risk. These factors will inform the schedule and cost for explorations during Options Analysis. The hydrogeologist or geotechnical lead should collaborate with others on the Project Team to develop a project-specific approach. This approach should follow the requirements described in the current City of Seattle Stormwater Manual. However, since retrofit GSI CIPs are not typically built because of stormwater code requirements and are owned and maintained by SPU or WTD, geotechnical exploration requirements can be more flexible and rely on professional judgement for deviations from the code requirements to balance geologic uncertainty with cost.

As a general guide, Figure 5 illustrates a typical geotechnical/hydrogeologic workflow, which includes four stages of evaluation.

Project-Specific Considerations

The stages of evaluation required are often dependent upon the scale of the project and quality and quantity of existing geologic data for the study area. For example, a large project that covers an entire drainage basin may require all stages and possibly multiple iterations of exploration and testing between each stage, in coordination with review of the ROW infrastructure conditions for narrowing in on feasible areas. Whereas, a small project that is focused on a few blocks may require significantly less geotechnical/hydrogeologic evaluation. The type of BMP selected for a particular project may similarly influence the required level of effort. As an example, projects that will rely on infiltration for discharge of the stormwater (shallow and deep infiltration technologies) generally require more exploration and testing than a project of similar size that utilizes underdrain systems and reconnects to the public drainage conveyance system.

Allow adequate time in project's schedule for field testing and monitoring

The Project Team shall prepare the project's overall schedule, factoring in preparation and permitting to conduct the soil exploration and run a test. Some soil tests and monitoring (e.g., measuring the seasonal high groundwater levels) need to occur through the wet season; in that case, the Project Team should obtain permits in early fall. Tests that require ground disturbance and street restoration require an SDOT permit, which can take time — from a few days to several weeks — to process. Tests that occur in Environmentally Critical Areas (ECAs) may require additional time to obtain environmental permits for the work.

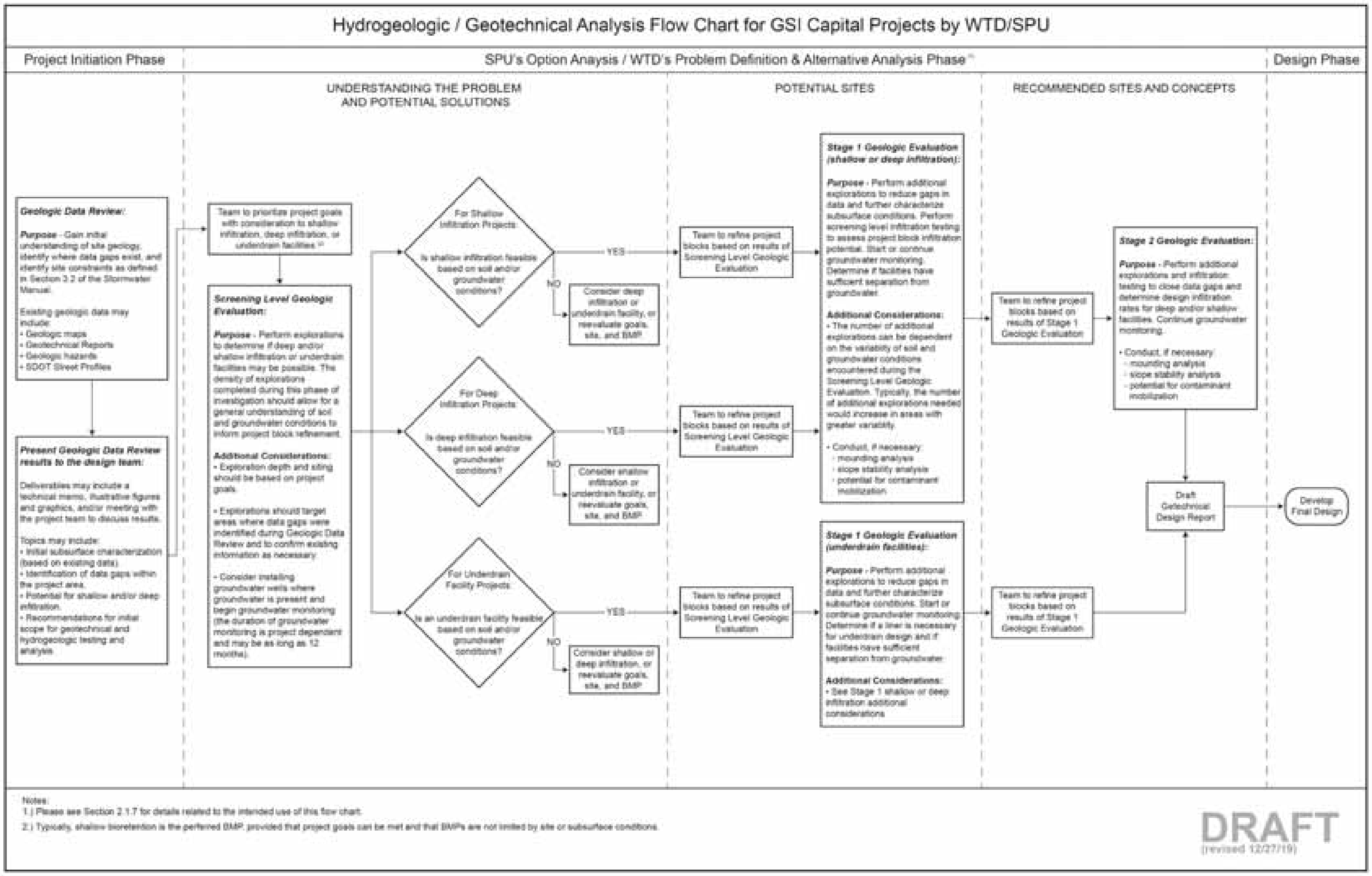


Figure 5 Hydrogeologic / Geotechnical Analysis Flow Chart for GSI Capital Projects by WTD/SPU

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2.1.8 Initial Design Parameters and Minimum Requirements

Objective: Understand the context of the project by confirming the initial design parameters and minimum requirements.

The Project Team should have enough background from the Initial Scope Statement and/or Design Guidance (SPU) or Initial Project Charter (WTD) to draft portions of the Project Report (see Section 5.2), including:

- **Project background,** including summaries of field verification, mapping, geotechnical information, known information about the project area, community surveys and comments, and information gaps.
- **Design standards** to be used on the project (e.g., applicable version of COS Stormwater Manual, GSI Manual, SPUs Design Standards and Guidelines, ROWIM)
- **Performance goals** for the project, such as creek protection, flow control, CSO reduction (if relevant), and costs, consistent with the scope statement developed in the PMP
- **Minimum requirements** to define thresholds that sites must meet to be candidate projects. This may include location, system type, needs for infiltration, minimum drainage areas, considerations of key risks, and implementation schedule. These requirements may be derived or updated from the Initial Scope Statement (SPU) or Initial Project Charter (WTD).
- **Site design criteria,** including trees and vegetation preservation, slope, grading, sun angle, access, mobility, maintenance, parking, encroachments, and utility protection. Neighborhood context, such as land use, setback, frontage length, topography and age, is important to define.
- **BMPs to be evaluated** throughout Options Analysis. Depending on the goals of the project, some BMPs may be more appropriate than others. For example, if infiltration is required to remove flow from the system, then infiltration potential will likely be the driving factor for feasibility.
- **Multiple benefits** to be considered through identifying potential opportunities and considerations.

Modeling Approaches

Select an appropriate modeling method based on project performance goals, available data or modeling, and project scope.

Confirm modeling responsibilities for the consultant and/or the agency. For example, a consultant might perform hydrologic modeling to estimate CSO performance based on sizing factors, but the agency might perform system modeling (hydraulic and hydrologic) to confirm estimated CSO performance.

See Section 4.1.5 for discussion.

- **Analysis methods and basis,** including modeling requirements, hydrogeologic conditions, geotechnical considerations, and infiltration rates.

If any of this information has not been decided during Project Initiation, it should be discussed and agreed to at this point. For example, project-specific site design criteria are provided by agency staff but a modeling approach needs to be selected out of a number of appropriate strategies. The division of modeling responsibilities among SPU/WTD and consultants might also need to be determined.

This information will be updated and included as portions of the Project Report (e.g., Background, Project Goals) to provide baseline information for the design team. While content for SPU-led and WTD-led Project Reports are similar, the terminology for the documentation completed during Options Analysis differs.

Budget Constraints

Establish how budget constraints may impact the approach to Options Analysis. Potential approaches include setting a minimum cost-performance efficiency, a maximum cost per block, or limiting the number of blocks to be built.

SPU Projects

An initial Project Report (including draft PMP, Basis of Design, Geotechnical Analysis, and PEP) should be initiated during the Options Analysis Phase. The purpose of the project and three key performance indicators should be included in the Basis of Design of the Project Report.

See Appendix C for an example design guidance document.

WTD Projects

A technical memorandum should be completed during the Problem Definition phase. The project should be approved for funding and transferred to the Capital Project Management Unit, and an Initial Project Charter should be developed. Up to 30% design, a Basis of Design and Alternatives Analysis report will be written. If the project has a Facility Plan, it is to be approved by Ecology for state revolving loan funding. King County’s Consent Decree with Ecology, U.S. Environmental Protection Agency (EPA), and U.S. Department of Justice (DOJ) requires a Green for Grey Substitution report for projects proposing GSI to address CSOs. The report must be approved by Ecology and EPA. The Green for Grey Substitution report has a deadline outlined in Appendix E of the County’s Consent Decree. All agency staff and consultants should be familiar with the Consent Decree.

See the Project Report outline in GSI Manual, Volume III: Design Phase, for more information about the Project Report for Options Analysis.

2.2 Potentially Feasible Sites in Project Area

Once the goals of the project have been confirmed and project-specific plans have been developed, the Project Team should review available information to confirm the feasibility for siting GSI within the project area. If this evaluation has already been conducted as part of Project Initiation, the Project Team should review and confirm the validity of the analysis. The general goal of this step is to narrow in on feasible sites before spending significant effort to develop block-scale detail. Sites that are infeasible per this step should not be considered further.

The work is to conduct Screening Level Geologic Evaluation, Desktop Feasibility Review, and Site Context and Social Function Review to develop a Potentially Feasible Area Map. This map can then be used to Identify Potential Partnership Sites and Develop a Stage 1 Exploration Plan.

2.2.1 Engage Community to Understand Problem(s) and Study Area

Objective: If appropriate, describe the nature of the problem, engage community about their experiences, and share information about project study area. Request input to inform the review of the project study area.

During the Options Analysis Phase, successful public engagement will create a shared understanding of the need for and purpose of the project, as well as the steps in the decision-making process. After developing the PEP, the Project Manager or LOB rep, in coordination with the PEL, should reach out to key stakeholders to introduce the project and better understand their issues and concerns. The Public Engagement Lead supports the project team in implementing the PEP.

During this step, PEP implementation will:

- Engage community about the problem, their experiences and the project's mandate.
- Document technical information about the problem (such as drainage issues, use of sump pumps, seeps, and nuisance ponding)
- Build relationships with stakeholders
- Identify community concerns and questions
- Provide opportunities to discuss possible solutions

The information gathered from the outreach activities will inform the Project Team's Block-Scale Feasibility Maps (Section 3.1.5) and Initial Site Selection Maps (Section 3.1.6).

2.2.2 Geologic Data Review

Objective: Gather existing geologic data in the project area to inform initial site screening and confirmation of BMPs, and to conduct a gap analysis to inform further exploration needs.

As a general guide, Figure 5 illustrates a typical geotechnical/hydrogeologic workflow, which includes four stages of evaluation. The first stage consists of Geologic Data Review and is completed during the Project Initiation Phase. At the start of Options Analysis, a map of potentially feasible areas and geotechnical hazards should be identified based on available mapping of the area. If some of these tasks were not completed prior to start of Options Analysis, then they should be done at the start of Options Analysis for initial screening of the project.

The subsequent stages, which consist of a Screening Level Geologic Evaluation, a Stage 1 Geologic Evaluation, and a Stage 2 Geologic Evaluation, are completed during Options Analysis and are discussed in subsequent sections. Each stage of evaluation should fill data gaps and should be coordinated with the Project Team (design and public engagement, in particular) prior to any field work. The Project Team should consider using an exploration plan to coordinate activities.

2.2.3 Screening Level Geologic Evaluation

Objective: Identify areas that will be considered during Options Analysis, taking into account feasible infiltration areas and geotechnical hazards.

Before proceeding to the Screening Level Geologic Evaluation (Figure 5), existing geologic/hydrogeologic data prepared during the Geologic Data Review (Section 2.2.2) should be reviewed to identify areas potentially suitable for the selected infiltration BMPs. This data should also help identify areas where existing data is limited or unavailable, and to screen out project blocks where infiltration BMPs are not feasible.

Outreach for Geotechnical Explorations and Field Work

All planned field work requires notification to the community. See Section 2.2.9 for related outreach activities.

A Screening Level Geologic Evaluation should include subsurface explorations that target areas in which data gaps were identified and areas in which existing data needs to be confirmed. The density of explorations completed during this phase of investigation should allow for a general understanding of soil and groundwater conditions and lead to the refinement of project blocks. Data gaps should be further reduced during a Stage 1 Geologic Evaluation, as described in Section 2.2.8.

Exploration depths should be determined based on project goals (i.e., shallow or deep infiltration). At this phase, it may be advantageous to install groundwater monitoring wells. The duration of groundwater monitoring is project-specific and might take up to 12 months to complete. Groundwater monitoring requirements should be carefully considered when developing the project schedule.

The results of the Screening Level Geologic Evaluation should be used to determine whether the selected infiltration BMP remains feasible and to refine the location and number of project blocks suitable for design. If the BMP is not feasible, the Project Team should reassess to determine whether project goals can be achieved through the use of alternative BMPs or by expanding the project area. For example, if infiltration is not feasible, the team should determine whether outlet control can be used as an alternative, or whether a facility can include an underdrain that discharges back into the drainage system.

2.2.4 Desktop Feasibility Review

Objective: Leverage existing resources available to evaluate feasibility prior to committing resources to obtain site-specific field data.

Data is gathered throughout Options Analysis with additional level of detail as the number of sites being analyzed is narrowed down. Any preliminary feasibility analysis done during initiation (SPU)/Problem Definition (WTD) should be reviewed. If this high-level analysis has not been conducted or warrants an update due to refined project goals or data available, then the Project Team should conduct a desktop feasibility review of potential streets.

In general, the data gathered can be categorized into three main types: subsurface conditions, street conditions, and neighborhood/regional factors. Subsurface conditions characterize important factors beneath the surface; street conditions characterize important aspects and functions of the individual street; and neighborhood/regional factors characterize the surrounding context beyond an individual street. Team members should coordinate on the review of conditions. For example, characterization of the subsurface should be conducted in areas where BMPs would be sited (such as downstream end of the block where flow would concentrate, or along the full block if cells are intended to be dispersed).

Data Management

Data is collected throughout Options Analysis at various levels of detail to inform different parts of the analysis. Develop data protocols to organize the information in a meaningful way at each step. Consider using a database (GIS or Excel) for evaluating multiple sites, and datasheets for documenting site-specific details. Example datasheets are available in Appendix L.

The intent for data collection is to right-size the effort for gathering information at each stage of Options Analysis, with more detail gathered for blocks selected to move forward through each OA step. In the Understanding the Problem and Potential Solutions step, data can be streamlined using desktop analysis. In the Potential Sites step, detailed data is gathered in the field during Site Reconnaissance for OA (see Section 3.1.4). Table 2 summarizes the three types of data (subsurface, street, neighborhood/regional) collected at these two steps (desktop and field).

Table 2 Desktop and Field Data Collection

Data Type	What are you trying to answer?	Desktop Feasibility Review (Section 2.2.4)		Site Reconnaissance for Options Analysis (Section 3.1.4)	
		Data Parameter	Notes	Data Parameter	Notes
Subsurface Conditions					
Potential Geologic Hazards	Should you infiltrate?	Environmental Critical Areas	Review ECAs that impact infiltration feasibility such as steep slopes, erosion and landslide areas. Refer to applicable section of Stormwater Code.	Seeps	Seepage may indicate high groundwater issues. Walk the site during and after storms. Listen for running water in storm grates after storm has passed to identify potential groundwater issues. Look for staining or biological growth that is not due to a closed depression or lack of a drainage structure.
Infiltration	Can you infiltrate? If so, how much?	Infiltration feasibility	Review soil units and previous studies to determine areas infeasible for infiltration. Eliminate sites where infiltration techniques are prohibitive, such as steep slope or hazard areas.	Infiltration feasibility	Revise infiltration feasibility as needed based on data gathered during subsurface explorations. See Figure 5.
		Infiltration suitability	Review areas potentially feasible for infiltration and characterize infiltration suitability. For example, if only shallow infiltration would be needed, the site should be rated higher than if deep infiltration would be needed, because the former has lower costs for infrastructure and investigation. Give sites with low potential for infiltration low ratings. See Figure 5.	Infiltration suitability	Estimate native infiltration rates based on data gathered during subsurface explorations. See Figure 5.
Street Conditions					
Space Available	What fits?	Estimated space available	Review high resolution aerials and/or Google Street View to visually estimate how much of the ROW may be available for retrofits. Sites with ample available space within the planter/shoulder or street section should be rated higher; these will have minimal driveways, few mature trees, and no designated on-street parking spaces or other limits on bioretention placement. Note opportunities for unique retrofit opportunities such as Road Diets if significant space is available.	Planting strip/shoulder width	Informs space available for bioretention cross-section. Consider the planting strip/shoulder grading and how it affects space for bioretention cross section. Also consider offsets from parallel utility constraints such as water, sewer, or gas mains.
		Utilities	Review existing utilities including stormwater, combined sewer, sanitary sewer, storm drains, and Seattle City Light GIS data focusing on identifying major utility conflicts/constraints. Latest data available by request from SPU. Review franchise utility data if available.	Utilities	Confirm presence of utilities identified and note indications for other major utility conflicts. For example, power poles with lines running to the ground may indicate underground power.
		Longitudinal slope	Review available data. Rate blocks with minimal longitudinal slopes high and blocks with moderate slopes lower. Eliminate steep slopes.	Driveways	Note location, width, and paved versus unpaved.
				Pedestrian access	Note existing pedestrian access needs such as walkways and parking.
				Mature, healthy trees	Note mature, healthy trees in planting strip or on private property with canopies that overhang into the planting strip as an indicator for Critical Root Zone.

Data Type	What are you trying to answer?	Desktop Feasibility Review (Section 2.2.4)		Site Reconnaissance for Options Analysis (Section 3.1.4)	
		Data Parameter	Notes	Data Parameter	Notes
				Sidewalk width	Note sidewalk width. If existing sidewalk width is less than standard, consider whether there is space for future widening at the back of walk. If there is no sidewalk, confirm whether space in the existing planter needs to be reserved for future sidewalk.
				Traffic circles	If a traffic circle is at the downstream end of the block, end of block curb bulbs are not feasible.
Constructability	What other factors may affect constructability or feasibility of ROW retrofit?			Longitudinal slope	Determine approximate longitudinal slope of ROW (using GIS data if possible, or a Smart Level).
				Roadway cross slope	Note cross slope and consider impact to bioretention cross-section.
				Road material	Review SDOT database and confirm in field. Road material impacts cost for replacement.
				Adjacent private property	Note relative elevation of private property (if possible) and conservatively assume each site has a basement.
				Narrow ROW width	Narrow rights-of-way may create contracting staging and traffic control challenges.
				Adjacent topography	Steep adjacent topography (including driveways, walkways and retaining walls) may cause grading challenges.
				Utilities	Presence of overhead power lines may hinder drilling equipment for geologic investigations, construction, or routine operations and maintenance equipment access.
Existing Street Use	What are the existing competing needs for the street?	SDOT GIS data	Review existing SDOT databases, such as parking zones (restricted parking, peak-hour no parking) and collision data as cursory indicators for characterizing parking and traffic needs. See ROWIM for additional siting guidance regarding impacts to freight, transit, and fire routes.	Roadway arterial classification	Arterial classifications determine step-out requirements, such as step-out zones or shoulders. See design manual for additional details regarding ROW retrofit design on Neighborhood Yield and Neighborhood Curbless streets.
		Street type	Review ROWIM for street typology and street classification. Street typology and street classification is intended to guide future development and capital infrastructure projects. Review if ROW width is standard for the street typology to determine if there is potential space.	Designated/signed on-street parking zones	For example, loading/unloading zones and City-permitted on-street parking for people with disabilities.
				Encroachments	Private improvements in the ROW may be indicative of public input/perception. Private improvements may include planter boxes, veggie gardens, and lending libraries.
Future Street Use	Are there opportunities to improve the ROW and/or provide other co-benefits?	Alignment with partnerships	Identify or screen sites that align with potential partnering locations such as Neighborhood Greenways, utility main extensions/replacement, and SDOT sidewalks.	Street Type	Look for depaving opportunities on streets where the existing road width exceeds the standard in ROWIM for a street's typology that would then widen the planting strip for bioretention. Look for opportunities for curb extensions with bioretention on streets with wide road pavement to shorten crossings at intersections.
		Potential ROW improvements	Identify streets at which the potential GSI retrofit may also provide opportunities for other public improvements, such as sidewalks, formalized drainage and traffic calming.	Road condition	Review SDOT database and confirm in field. Poor road conditions may be an opportunity to improve the road or align with a planned project to improve existing conditions.

Data Type	What are you trying to answer?	Desktop Feasibility Review (Section 2.2.4)		Site Reconnaissance for Options Analysis (Section 3.1.4)	
		Data Parameter	Notes	Data Parameter	Notes
		Service equity	Is the street within an area with long-standing inequities as defined by the City? Also consider Environmental and Social Justice evaluation.	Sidewalk condition	Review SDOT database and confirm in field. Poor sidewalk conditions may be an opportunity to improve the sidewalk or align with a planned project to improve existing conditions.
				Other drainage issues	Look for staining or biological growth that may indicate nuisance ponding. Characterize drainage issues based on past complaints or outreach surveys.
Effective Contributing Area	What will it mitigate?	Disconnected roofs	GIS data may be available via SDCI databases	Disconnected roofs	Any roofs disconnected from the stormwater system discharging onto sidewalks or driveways should be considered tributary to the curbline.
		Longitudinal slope	GIS data may be available via SDOT databases	Longitudinal slope and cross slope (thrown versus crowned)	Determine if there are closed depressions or high points along the block's longitudinal slope. Observe sheet runoff during a storm event or use a level to check road tilt/cross slope during dry weather at multiple locations along the road. Check for inlets and catch basins on one or both sides of the downhill end of the street. Confirm the road drains to the CBs by observing conditions in the rain.
		Existing drainage infrastructure	GIS data available from SPU staff	Existing drainage infrastructure	Note drainage system type (curb versus curbless) and note potential discharge points. Verify with GIS information.
				Drainage flow patterns	When possible, conduct field visits during a rain event to observe flow patterns (such as gutter flow path and/or sheet flow paths) in the ROW and note where flow tends to become concentrated. This is important on informal streets where flow paths are more difficult to discern. Look for opportunities to re-route existing flow patterns for efficient interception (for example, flow slipping or piping flow from adjacent blocks).
				Run-on to ROW	Estimate drainage contribution boundary from parcels (flow path/estimate of impervious area contribution).
				Capturable drainage area	Estimate how much contributing area can be reasonably captured by a stormwater facility based on available space at the lowest point of the block.
Neighborhood/Regional Factors					
Effective Contributing Area	What will it mitigate?	Topography	Review the topography in the project area for a general sense of drainage areas. Focus on areas where stormwater can be efficiently intercepted. Are there regional low points? Consider project-specific goals. For example, if the goal is CSO reduction, identify sites with potential contributing area to the combined sewer, and eliminate sites not contributing to the target system.	Effectiveness scaling factors	Estimate effective contributing area by multiplying contributing area (defined as area contributing to the potential facility) by an effectiveness scaling factor (which depends on surface type). See Volume III: Design Phase for typical scaling factors.
Site Context and Social Function	What is appropriate for	Features of the neighborhood	Review high resolution aerials to characterize the general context of the neighborhood. Are there opportunities to connect amenities?	Interactions with community members	Any interactions with the community during field work should be documented, and contact information should be obtained.

Data Type	What are you trying to answer?	Desktop Feasibility Review (Section 2.2.4)		Site Reconnaissance for Options Analysis (Section 3.1.4)	
		Data Parameter	Notes	Data Parameter	Notes
	the neighborhood?	Zoning of the neighborhood	Review zoning of the neighborhood and document the impact of potential future development on the areas proposed for GSI.		
		Street type	Review ROWIM guidance on appropriate BMPs to be used based on street type.		
		Environmentally Critical Areas	Review ECAs for environmental factors that may impact GSI siting, such as wetlands and critical aquifer recharge areas.		

Based on the data collected, consideration for project-specific goals, and BMPs being considered for the project, the team should define what parameters make an area "infeasible." Infeasible areas identified during this step should not be revisited for further analysis. See Appendix D for a sample of data and logic to determine where NDS is potentially feasible.

In addition to identifying infeasible areas, the desktop feasibility review should characterize: the needs of the community; how GSI could benefit the community; and how GSI could improve the streetscape at a high level. The Project Team should consider reviewing existing community plans or other documents that have captured community input or preference in the project area. The team should coordinate with Public Engagement for the best approach to inform this high level of analysis prior to performing targeted outreach.

Defining Infeasibility

Some parameters, such as ECAs, may make an area infeasible for all GSI projects. Additional parameters may be applicable based on project-specific goals and the BMPs being considered.

A project only considering infiltrating BMPs would primarily define infeasibility by infiltration potential.

2.2.5 Site Context and Social Function Review

Objective: Review the site context to inform BMP selection, as well as the evaluation of potential impacts and opportunities to enhance existing functions within the right-of-way.

The Project Team members should conduct a drive-through visual review of the potentially feasible areas to familiarize themselves with the community and site conditions. A goal of the Site Context and Social Function Review (see GSI Manual, Volume III: Design Phase for discussion on designing for site context and social function) is to confirm the potential streets identified for the project in the Project Initiation Phase (see Project Initiation flow chart for GSI Manual, Volume I) and refine understanding of the potential feasible locations within the street ROW. The Project Team should visit sites in selected blocks and note site-specific constraints in a field map or diagram. Field maps may be generated from GIS, aerial photos, or sketches. The team should note site-specific constraints for siting GSI, including mature vegetation, mobility access issues, parking use, and presence of utilities or driveways.

Project-Specific Considerations

Site Context and Social Function is challenging to define and may influence the decisions made during Options Analysis differently from project to project. The Project Team should document data gathered and discussion of Site Context and Social Function Review for each site being considered.

2.2.6 Potentially Feasible Area Map

Objective: Characterize the potential feasibility of siting GSI, as indicated by existing data, within the project area.

Technical staff should review feasibility assumptions used to identify streets that are suitable for GSI retrofits in a given basin. Based on the review of available geotechnical data, Project Initiation Analysis, and Site Context and Social Function Review, a Potentially Feasible Area Map should be developed, indicating each block's initial assessment of feasibility. Initial feasibility should be rated as follows:

- High: No or minimal limitations noted
- Moderate: Some challenges noted but likely possible to mitigate through design
- Low: No fatal flaws but would be very challenging to site
- Infeasible: Fatal flaws noted

Initial Site Rating

Initial site ratings should indicate how well the BMPs identified for Options Analysis might fit the street context. Historically, this rating system has been a measure of how well graded side sloped bioretention cells fit within the planter strip/shoulder or bulb-out due to the City's preference for graded side sloped edges in Neighborhood Yield and Neighborhood Curbless streets. In addition to fitting the existing street context, the Project Team should consider how to rate opportunities for depaving or traffic calming in coordination with SDOT.

The Project Team may want to use this analysis to narrow down to a certain number of blocks to be evaluated for potential siting and design. In general, about 200% of blocks intended for construction should be evaluated further. This may vary based on the flexibility of the number of blocks planned for construction — i.e., maximum extent practicable (MEP), maximum extent feasible (MEF), or defined control volume — or the technical complexity of construction (e.g., narrow planters/shoulders or uncertain infiltration conditions). For example, if the project area is technically difficult for retrofits, then it may be worth gathering additional detail for more blocks to avoid removing blocks before fully understanding the constraints.

For SPU-led projects, confirm with the LOB representative to establish expectations for the level of effort in the Potential Sites step. For WTD-led projects, confirm with the Project Manager to establish expectations for the level of effort in the Potential Sites step.

See Appendix E for an example of a Potentially Feasible Area Map.

2.2.7 Identify Potential Partnerships Sites

Objective: Identify potential partnerships sites based on updated feasibility analysis.

The Potentially Feasible Area Map can also be used to identify potential partnerships sites. For example, a review of the Seattle Pedestrian Master Plan may show an overlapping opportunity to coordinate new and/or replaced sidewalk on a feasible site. The Project Manager should maintain coordination with partners (where applicable) to align street selection and project schedules, to integrate co-benefits of partner projects, and to ensure messaging to the public is consistent.

2.2.8 Stage 1 Geologic Exploration Plan

Objective: Develop an exploration plan to fill data gaps.

The Project Team should develop a Stage 1 Exploration Plan for subsurface exploration to target areas where data gaps were identified or existing data needs to be confirmed. The Exploration Plan should identify field data needed to supplement the historical data reviewed. The data should be sufficient for defining the infiltration strategies (shallow, deep, unlined systems with underdrains and/or infeasible areas), the potential range of infiltration rates to use for initial concept modeling (for shallow and deep infiltration), and the geotechnical and hydrogeologic risks. It should also determine locations and types of additional subsurface exploration for the study area, with explanations about how this work will address identified data gaps. See Section 3.1.2 for additional detail.

The Potentially Feasible Area Map (Section 2.2.6) that results from this step of Options Analysis should inform the Stage 1 Geologic Evaluation (Section 3.1.2).

2.2.9 Outreach for Field Work Notifications

Objective: Inform residents of field work along their streets, including the purpose and nature of the field work.

Field work notifications are often a team's first introduction to the neighborhood. They establish a tone for the project. While it seems minor, it is especially important that these early interactions build credibility for the agencies with the neighborhood. When Project Team staff will be in the community looking at ROW conditions and conducting tests along streets to gather information, they should have provided advance notice or, at minimum, be prepared to successfully represent the project and agencies. Examples of field work are geotechnical explorations and field reconnaissance (e.g., windshield survey review).

- Geotechnical explorations will likely be the first GSI-related work that project neighbors see or hear because it involves some equipment and ground disturbance. This work requires clear and accurate community notifications in advance of work.

- Residents might also observe designers from the Project Team conducting field reconnaissance (e.g., taking measurements, photos, and reviewing maps). Field reconnaissance will not involve ground disturbance, so advance notification is not normally required. The Project Team will provide at least one month's notice of field work (even if actual dates are unsure) so they can adequately plan and determine the best outreach strategies and materials.

The hydrogeologists and geotechnical engineers, along with design leads, should coordinate with the Public Engagement Lead to develop content for notices to inform neighbors of the field testing, with information about what to expect and how it will be used to inform the analysis of the project study area and, if appropriate, larger project context. With proper advance notice, the PEL will provide outreach materials to the project team and/or distribute to the community. SPU strives to provide at least one week's notice of planned field work to the community; those on the Project Team preparing the outreach materials will provide two weeks' notice to develop and distribute or mail flyers.

During this step, PEP implementation will:

- Build a positive working relationship with project neighbors
- Introduce the project, the project team (with contact information), and where to find more information
- Inform affected residents about the purpose, nature, and impacts of the field work.

During field work, staff from the Project Team may have interactions with the public. The Public Engagement Lead should inform the Project Team on protocols to help guide and document any interactions with project neighbors. The Project Team should review project Frequently Asked Questions (FAQs) before field work and have outreach materials on hand to provide to stakeholders. It should be clear whom neighbors can contact for more information (typically the agency's Project Manager or LOB representatives).

Section 3

Potential Sites

The intent of the Potential Sites is to develop block-scale detail and select sites to move forward for developing Concept Plans and budget estimates. This step includes data from all disciplines and is an iterative process of data collection and refinement. Project-specific approaches for coordinating inputs from hydrogeologic and geotechnical experts, members of the public, project partners, and others should be documented in the plans developed during the Understanding the Problem and Potential Solutions step. The following sections elaborate on the activities anticipated. The subsections below describe the process for gathering detailed information for sites and selecting which sites will undergo further concept development.

Figure 6 provides an overview for the activities related to this step of Options Analysis. Each activity is described in more detail below.

Figure 6 Potential Sites Workflow

3.1 Block-Scale Analysis

In general, the workflow for conducting Block-Scale Analysis includes confirming evaluation criteria for site selection, conducting Stage 1 Geologic Evaluations, and performing Site Reconnaissance for Options Analysis to develop Block-Scale Feasibility Maps and the Initial Site Selection Map. The Project Team should also select design scenarios and standard details as a preliminary basis of design to inform field efforts. Depending on the project-specific public engagement model, block-scale detail and/or Site Selection Maps may be shared with the public for input to inform site selection for concept design.

3.1.1 Confirm Evaluation Criteria for Site Selection

Objective: Establish a basis for selecting and/or prioritizing blocks/sites to identify field data collection needs.

Evaluation criteria should be included in the Project Scope Statement or Charter. However, the Project Team should review the criteria in the context of the work conducted to evaluate potentially feasible sites and as appropriate, adopt or refine evaluation criteria based on project goals to rank potential sites using a consistent methodology. The rating can use a scoring matrix or general terms — such as high, medium, and low potential — and must include consideration for opportunities to provide co-benefits and constraints — such as feasibility, cost, risk, and performance. Each criterion should include a method of measurement. For example, a quantitative criterion, such as an estimate of CSO volume removed or ROW effective impervious contributing area, may be a direct measurement; a qualitative criterion, such as traffic calming potential, may be scored on a scale of 1 to 5. Confirming these criteria prior to site reconnaissance is important for developing appropriate field forms for data collection. Refer to Table 2 for subsurface conditions, street conditions, and neighborhood or regional factors for which the team should consider developing ratings.

Examples of evaluation matrices and ratings used on past SPU and WTD projects is included in Appendix F.

3.1.2 Conduct Stage 1 Geologic Evaluation

Objective: Characterize subsurface conditions to inform infiltration feasibility (deep, shallow, or infeasible) and geotechnical hazards.

A Stage 1 Geologic Evaluation (Figure 5) should include explorations and testing intended to further reduce data gaps, provide a more detailed characterization of subsurface conditions, and help determine what infiltration techniques are available and whether facilities will have sufficient separation from groundwater. Explorations likely would include groundwater monitoring wells at locations where groundwater is present at a depth less than 15 feet. The number of additional explorations can be dependent on the variability of soil and groundwater conditions encountered during the Screening Level Geologic Evaluation.

Screening level infiltration tests should be completed to assess project-block infiltration potential. Infiltration test methods should be selected and conducted according to the current 2016 City of Seattle Stormwater Manual. Additional infiltration testing should be anticipated during a Stage 2 Geologic Evaluation (Section 4.1.1).

For projects that will include facilities with underdrains, infiltration testing might not be necessary. However, explorations might be needed to determine whether a liner is required for underdrain design.

Additionally, groundwater wells may be required to determine whether facilities have sufficient separation from groundwater. A groundwater monitoring program might be applicable for such projects.

Conduct, if necessary, geotechnical/hydrogeologic analyses (e.g., groundwater mounding, slope stability, and/or potential for contaminant mobilization). Certain analyses are required when project blocks do not meet the minimum setback requirements for infiltration facilities presented in the current City of Seattle Stormwater Manual.

The results of the Stage 1 Geologic Evaluation should be used to determine whether the infiltration BMP remains feasible and to refine the location and number of project blocks suitable for design. If the BMP is not feasible, reassess the project to determine whether project goals can be achieved through the use of alternative BMPs or by expanding the project area.

3.1.3 Select Design Scenarios and Standard Details

Objective: Confirm feasible GSI practices to meet project objectives, identify GSI layouts and scenarios to fit site context, and identify options for consideration in alternatives.

Depending on the goals of the project and the data collected from Stage 1 geologic investigations and site reconnaissance, select and document the appropriate design scenarios and standard details. For example, concepts for siting bioretention in Neighborhood Yield and Neighborhood Curbless streets for various design scenarios are discussed in GSI Manual, Volume III: Design Phase. At a minimum, the following should be documented:

- Both treatment BMP (e.g., bioretention cross-section type pervious concrete alleys, and non-GSI BMPs) and associated infrastructure for method of discharge (e.g., infiltration via shallow infiltration, screen wells, drilled drains, or pit drains, and/or discharge back to drainage system).
- Design criteria used, as well as the source of guidance or regulatory standards (e.g., “maximum temporary ponding depth based on the GSI Manual, Volume III: Design Phase”).
- Deviations from ROWIM.
- Exceptions from GSI Manual (see GSI Manual, Volume III: Design Phase).
- BMP performance targets to meet project goals, such as water quality treatment, flow control, CSO reduction, or a targeted sizing factor set by the agency for the basin.

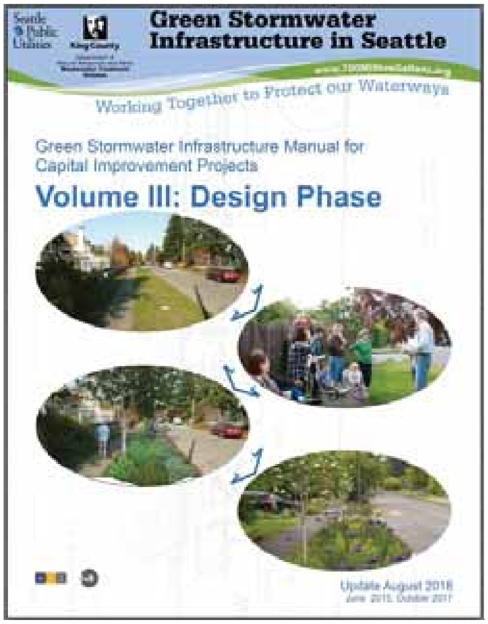
What is “Green”?

The GSI Manual focuses specifically on providing guidance for bioretention retrofits in the City’s right-of-way, which is the more common GSI facility used by SPU. Other stormwater treatment and/or infiltration BMPs might be part of a project’s analysis of options. For example, bioretention on a Neighborhood Curbless street may include options for conveyance swales.

- Description of which BMPs would benefit the community and streetscape (e.g., graded side sloped bioretention is best suited for Neighborhood Yield and Neighborhood Curbless streets as described in GSI Manual, Volume III: Design Phase).

If a project proposes using a technology in the right-of-way that is not in the COS Standard Plans or GSI Manual, then the team should review the approach with City of Seattle. If a project proposes an exception to the guidance/requirements noted in the GSI Manual, then the Project Team shall review with SPU's GSI Projects Program Manager. See GSI Manual, Volume III: Design Phase for additional information. Example exceptions may include: requesting to use bioretention cells with four-sided vertical walls on Neighborhood Yield streets, or requesting to use a proprietary media/stormwater treatment facility.

If a project proposes deviations from ROWIM or COS Standard Plans, see process for requesting a deviation from SDOT and inform the SPU's GSI Projects Program Manager. Example deviations may include: requesting modification to the road width from what is noted as the standard for a specific street typology; proposing to use pervious concrete or porous asphalt for a public street; or not providing space for future sidewalk as shown for the street typology.



Seattle Public Utilities

King County

Green Stormwater Infrastructure in Seattle

Working Together to Protect our Waterways

Green Stormwater Infrastructure Manual for Capital Improvement Projects

Volume III: Design Phase

Update August 2018
June 2015, October 2017

Image: GSI manual, Volume III: Design Phase

3.1.4 Site Reconnaissance for Options Analysis

Objective: Conduct field work to collect data to identify areas suitable for GSI on each block, understand site context, and confirm appropriate BMPs.

The Project Team should conduct site reconnaissance to collect data, characterize the existing street context and refine feasibility. This requires coordination from all the disciplines to understand how new information from each discipline affects feasibility. Key points of coordination include:

- Geotechnical evaluation (which sites should be included in exploration plan, public outreach for exploration activities, and exploration results impacting feasibility).
- Public input (what information is shared with residents, what input is being solicited, and how that input affects BMP and block selection).
- Partnering opportunities (if applicable, partnership sites may have unique evaluation, design, and siting criteria).
- Site context and social function

Refer to Table 2 for potential data parameters to be gathered in the field to characterize subsurface conditions, street conditions, and neighborhood/regional factors, as well as methodologies for gathering the data. The Project Team should perform site reconnaissance to collect site-specific data. Field forms, data collection protocols, and field maps should be developed to ensure consistent input on all blocks being evaluated. Field maps should include available GIS data (topography/contours, utilities, etc.), maps from the Development Services Office for City of Seattle (DSO) and SDCI, Puget Sound Energy (PSE) maps, and aerial photos.

Site Reconnaissance Methodology

Site reconnaissance may be a combination of desktop and field activities for efficient and consistent data collection. Review existing SDOT GIS databases to pre-populate field forms.

Document time of year and weather conditions during site visit. Additional follow-up visits may be required to confirm assumptions. For example, to check drainage flow patterns, conduct visits during a rain event. Or, after fall leaf drop, some elements may become more visible for understanding conditions. On-street parking and traffic can also vary throughout the day.

3.1.5 Block-Scale Feasibility Maps

Objective: Document feasible locations within the block for siting GSI facilities.

Document the site visits and observed conditions in a field form and/or database. To inform concept design and for identification of areas for community outreach, the project team should develop Block-Scale Feasibility Maps identifying potential area available for individual BMPs, including initial feasibility ratings for each location along the block. The initial block-feasibility ratings of high, moderate, low, and none should be based on criteria set by the Project Team given the available information compiled at this stage of Options Analysis. Site feasibility criteria might be different for each BMP (e.g., narrow road width might make a bioretention curb bulb infeasible but might not affect the feasibility of a proposed cell within the existing planter/shoulder).

In addition to technical feasibility, the site context and social function should also be characterized, such as demand for on-street parking, traffic calming, pedestrian access, to assess propriety for the BMP within the existing context.

This initial BMP selection and site-feasibility assessment should be determined according to the Project Team's judgment and is intended to communicate all feasible BMP locations. The Block-Scale Feasibility Maps may be revised based on coordinated efforts with the geotechnical and public engagement disciplines. The Block-Scale Feasibility Maps are primarily intended for technical evaluation of feasibility and site context. For outreach to the community, separate graphics and maps should be developed to communicate to the public about feasibility analysis and solicit input locations. See Section 3.2.1 for discussion.

See Appendix G for sample site reconnaissance protocols, forms and example Block-Scale Feasibility Maps.

3.1.6 Initial Site Selection Map

Objective: Update documentation of feasible sites to be considered for concept designs.

Based on the data collected throughout the Block-Scale Analysis step, update the initial site ratings developed in the Potentially Feasible Area Map by applying the Evaluation Criteria for Site Selection. This map is intended to communicate to the team (and perhaps the public) which sites are being considered at each stage of evaluation. It may be updated at each OA step to ensure that all parties are aware of the sites under evaluation.

See Appendix H for an example Site Selection Map.

3.2 Site Selection for Concept Design

In general, the workflow for selecting sites to develop concept designs consists of confirming potential partnership sites, conducting a Cultural Review for SEPA, and revising initial site ratings to update the Site Selection Map. At this stage, the Site Selection Map indicates which sites are going to have Concept Plans and cost estimates developed. Once the sites have been selected, the Project Team should define options to be evaluated, confirm evaluation criteria for option selection, consider project risks, and develop the Stage 2 Exploration Plan.

3.2.1 Outreach for Potential Sites

Objective: Visit, share, and request input to inform selection of Potential Sites.

Once the Project Team has screened and evaluated the project study area and identified potential sites, information about potential sites can be shared with the community. Engagement tactics at this point varies based on the community. During this step, PEP implementation will include:

- Project overview (problem, purpose, map of study area, potential solutions, schedule)
- Studies, technical analysis and collected data
- Site selection criteria
- Potential solutions

- What we still don't know
- Community interests and concerns about the project and selected areas
- What the next steps are in the project schedule

For showing the potential sites, materials may include:

- Map of project study area
- Map showing how potential sites relate to the watershed/combined sewer basin
- Aerial photo overlaid with select GIS layers (e.g., ROW, road, sidewalk, and noted landmarks) of a potential street with areas outlined for potential bioretention zones, sidewalk and/or road alignment modifications (see samples in Appendix B)
- Visual representations of GSI with explanations of how systems work
- Photos of the types of GSI BMPs that the Project Team is evaluating

Typically, renderings of a concept are not recommended for Options Analysis because it is too early in the process and the design has not been developed. The design and appearance of the GSI on the street (including plantings, size, and scale) will be determined during the Design Phase. Renderings are more suited during the Design Phase when elements and project scope have been further developed (typically after 30% design).

The Public Engagement Lead implements outreach activities per the PEP.

Images, Photos and Graphics

If images, photos or graphics are shown of the GSI it is important that the images are consistent with what the Project Team is envisioning and are a viable concept for the site context. For example, if it is unknown whether roadside bioretention cells will have graded side slopes or vertical walls (like a stormwater planter), then show both images, inform the public it could be either, and ask for input on the potential concepts.

[Placeholder note: The SPU/WTD joint GSI program is considering developing a GSI library of images, photos, graphics etc that have been developed on past projects for Project Teams to use as resource when developing future outreach materials.]

3.2.2 Confirm Potential Partnership Sites

Objective: Update and confirm partnership sites, as applicable, to achieve cost-sharing and co-benefits.

The Block-Scale Analysis may impact the potential partnership sites identified earlier in the project. The Project Manager should maintain coordination with partners (where applicable) so that streets selection and project scheduling are aligned, co-benefits of partner projects are integrated, and messaging to the public is consistent.

3.2.3 Cultural Resources Review for SEPA

Objective: Review potential risks to cultural resources prior to dedicating further resources toward concept design and geotechnical exploration.

Depending on the identified study area for potential sites, a cultural resources review may need to be conducted. See GSI Manual, Volume III, Section 14 for other permitting requirements to consider during Options Analysis.

Image: Curb bulb in the Delridge neighborhood of Seattle

3.2.4 Revise Initial Site Ratings

Objective: Rate and prioritize sites based on evaluation criteria.

Based on the information gathered from the public, partnership development, cultural resources review (if applicable) and additional geotechnical data, the Project Team should rate each block based on the criteria established for the project and prioritize sites. The team should determine the number of feasible streets that have available space for appropriately siting the GSI to meet the project goals. If the number of feasible streets exceeds the project's needs, narrow down the feasible streets to about 150% of blocks intended for construction. If there are not enough feasible streets to meet the goals, the Project Team should revisit goals or stop the project. Potential siting is an iterative process; site selection may be refined as coordination tasks are completed during this step. Site selection refinements may occur at the following steps:

- After Stage 1 Geologic Investigation
- After site reconnaissance for Options Analysis
- After community engagement
- After potential partnership coordination

The sites selected at this stage should be evaluated further in the Recommended Sites and Concepts step. Site selection is primarily focused on selecting sites for concept development and assumes the design scenarios and standard details identified in Section 3.1.3 will be developed as a Concept Plan with the estimated construction cost for project budgeting.

3.2.5 Revised Site Selection Map

Objective: Revise and document sites selected to proceed to concept design.

Based on the Revised Initial Site Ratings, update the Initial Site Selection Map. This map is intended to communicate to the team and the public which sites are being considered at each stage of evaluation. At this stage of Options Analysis, the Site Selection Map should indicate which blocks will develop additional detail with Concept Plans and cost estimates. It should also inform Stage 2 Geologic Evaluation.

3.2.6 Update Project Risk Register

Objective: Evaluate risk profiles of each option to inform selection.

The Project Manager is responsible for coordinating a risk assessment to update the risks identified during Project Initiation and add any new risks. The risk assessment should consider whether any of the options have significantly different risk profiles to inform the selection of the preferred option. In addition, risk should be evaluated for each site and documented in the datasheets.

See Appendix I for examples of how risk was documented during Alternative Analysis/Options Analysis.

3.2.7 Stage 2 Exploration Plan

Objective: Develop an exploration plan to fill data gaps.

The details of the Stage 2 Geologic Evaluation will depend on the techniques indicated by the Stage 1 Geologic Evaluation (deep infiltration, shallow infiltration, or non-infiltrating). If the results of the existing and new soil borings indicate that there are no feasible sites for shallow or deep infiltration, the project should be reassessed to determine whether alternative discharge design, such as unlined/lined system with discharge to storm conveyance system, should be considered. See Section 4.1.1 for additional information.

Outreach for Geotechnical Explorations and Field Testing

Coordinate with the hydrogeologic/geotechnical teams to notify neighbors of geologic investigation activities. See Section 2.2.9 for additional detail.

Image: Curb bulb on Barton Street in the City of Seattle

Section 4

Recommended Sites and Concepts

At this stage of Options Analysis, enough information has been gathered and considered to narrow down the number of sites to about 120% of sites anticipated for construction. The final round of geotechnical explorations are conducted; Concept Plans, data sheets and budget cost estimates are developed; and the community provides input on the concepts. By the end of this step, enough detail will have been developed to evaluate and recommend the preferred option to SPU/WTD management. The subsections below describe the process for developing concepts and evaluating options.

Figure 7 provides an overview for the activities related to this step of Options Analysis. Each activity is described in more detail below.

Figure 7 Recommended Sites and Concepts Workflow

4.1 Develop Concept Designs for Options Development

In general, the workflow for developing concept designs includes Conducting Stage 2 Geologic Evaluation, developing the Hydrogeological/Geotechnical Design Parameters for concept design, and documenting the Basis of Design for Concepts to develop Concept Plans and update datasheets.

4.1.1 Conduct Stage 2 Geologic Evaluation

Objective: Characterize subsurface conditions to recommend infiltration technique and preliminary infiltration rates.

By the start of a Stage 2 Geologic Evaluation (Figure 5), project blocks should be nearing final block selection, there should be minimal gaps in subsurface data, and infiltration techniques should be selected. A Stage 2 Geologic Evaluation should include additional explorations, primarily to facilitate infiltration testing, to eliminate any remaining data gaps and to develop design level infiltration rates. Infiltration test methods should be selected and conducted according to the current 2016 City of Seattle Stormwater Manual. Guidelines related to the number and distribution of tests are discussed in the Stormwater Manual. In cases where test results are variable, it may be necessary to perform additional tests to verify previous results. Groundwater monitoring should be in progress and continue through the end of the required monitoring period. The final determination of block feasibility is dependent on groundwater levels measured over the entire duration of the groundwater monitoring program.

The Project Team should conduct, if necessary, geotechnical/hydrogeologic analyses (e.g., groundwater mounding, slope stability, and potential for contaminant mobilization). Certain analyses are required when project blocks do not meet the minimum setback requirements presented in Section 3.2 of the 2016 City of Seattle Stormwater Manual.

4.1.2 Define Options

Objective: Define what options are going to be compared.

At this stage of Options Analysis, the Project Team should be familiar with the project area and areas suitable for GSI. The team should discuss what defines an option to be considered in the next stages as additional information and detail is developed. Options depend on the scale of the project and project goals and may compare various components of GSI siting and analysis, such as:

Defining an Option

Establish expectations for the anticipated number of concepts that are needed to determine the preferred option (i.e. number of blocks * number of concepts/blocks)

- Site selection (e.g., group of blocks for corridor alignment/efficient implementation versus individual block comparison)
- BMP selection (e.g., bioretention bulb out versus in-planter bioretention versus green alleys)
- Cell distribution (e.g., distributed versus consolidated)

Options should also include analysis of project goals. For example, comparison of a community-based option, performance-based option, and a hybrid that balances both aspects. Refer to SPU/WTD policies for what information is required for option comparison. Document approach for option development and comparison in applicable sections of the Project Report.

4.1.3 Confirm Evaluation Criteria for Option Selection

Objective: Establish a basis for recommending the Preferred Option

The Project Team should adopt or refine rating criteria from prior stages to rank two to four options using a consistent methodology. This should build upon the criteria developed in Section 3.1.1 but may include additional criteria and/or different rating scales depending on the types of options being considered per

Section 3.2.4. At a minimum, criteria should include consideration for performance, O&M, and co-benefits. Each criterion should include a method of measurement. The team should document the criteria in the Project Report (See GSI Manual, Volume III: Design Phase, Appendix C for Project Report Example Outline for SPU/WTD led CIPs with GSI). For SPU-led CIPs, these criteria are established by the LOB/GSI Program as part of the Initial Scope Statement and/or Design Guidance document. For WTD-led CIPs, these criteria should be confirmed at this stage, if not already defined.

Image: Bioretention at the Goodwill building in the City of Seattle

Samples of option evaluation matrices/ratings used on past SPU and WTD projects is included in Appendix J.

In addition to evaluation criteria for comparing options, the Project Team should confirm with the Project Manager whether any other established ratings systems will be used to quantify benefits of the project. Ratings systems could be used to measure sustainability (WTD Sustainability Scorecard, Salmon Safe, etc.) or other agency priorities.

4.1.4 Hydrogeological/Geotechnical Design Parameters

Objective: Document hydrogeological/geotechnical design parameters for Project Team to use on concept designs.

A Preliminary Hydrogeological/Geotechnical Design Report is required at the completion of a Stage 2 Geologic Evaluation. If infiltration is proposed, the design report should provide design infiltration rates to inform preliminary sizing for concepts (Section 4.1.5). The hydrogeological/geotechnical lead should consider and communicate the level of detail to be provided at this level of analysis. For example, block-specific infiltration rates may be valuable for optimizing design, but they also require hydrogeologic construction monitoring and testing to document the basis of the design. These recommendations should be used to inform the Concepts (Section 4.1.6) and Final Site Selection Map (Section 5.1.3). It is possible that additional exploration or testing may be required if the number of selected blocks is not sufficient to meet project goals.

4.1.5 Basis of Design for Concepts

Objective: Update BMP siting and design criteria for concept design.

The Basis of Design (BOD) within the Project Report for Options Analysis shall document the project goals (such as target flow reduction or water quality treatment), intended extent of project, and budget, based on scope statement, partnership coordination, public engagement, site context/social function, and design scenarios and standard details. In the Project Report, document BMP siting and design criteria used for development of the concepts, including the following factors.

Modeling and Facility Sizing

If a pre-sizing approach has been selected, document what sizing factors used. Sizing factors are recommended for bioretention projects with water quality/flow control goals and/or projects with many blocks to be evaluated. It is a simple approach to planning level facility sizing. Pre-sizing factors and methods can vary depending upon SPU/WTD project goals. See the City of Seattle Stormwater Manual for sizing factors or for other project targets. SPU/WTD may have already established other pre-sizing factors to use for Options Analysis.

If a modeling approach has been selected, document modeling protocols to be used to inform planning level facility sizing. Modeling is recommended for GSI projects with CSO performance goals because the impact of GSI on CSO system performance is a function of hydraulics, hydrology, and control strategy. However, if modeling is not feasible, sizing factors from past projects in basins assumed to have similar system behavior may be used. Modeling is also suitable for projects with flow control goals and limited blocks to be evaluated, because the additional effort may provide better flow control performance. See the City of Seattle Stormwater Manual, along with the Green Stormwater Infrastructure Modeling Methods document in Appendix H of GSI Manual, Volume III: Design Phase for modeling guidance.

WTD-LED GSI CIPs

As of May 2019, for WTD-led CIPs using GSI for CSO control, all system performance modeling will be performed in MIKE URBAN. Contact WTD PM for WTD standards for modeling GSI within MIKE URBAN.

Design Concepts and Deviations

Design of roadside bioretention facilities and associated infrastructure is described in GSI Manual, Volume III: Design Phase. If a project is using other types of BMPs not described in the GSI Manual or that deviates from the GSI Manual in designing roadside bioretention facilities and associated infrastructure, then the Project Team should document the design criteria for the other approaches and deviations in the Project Report. If a design concept (street detail, cross-section detail, or details for supporting infrastructure) is not available — or a deviation that has a significant impact on feasibility or performance is proposed — it should be discussed with all disciplines (such as SPU Asset Manager/WTD Operations, hydrogeological/geotechnical expert, public engagement/outreach specialist, civil engineer and landscape architect). Deviations or GSI BMPs not described in the GSI Manual are to be reviewed by the SPU GSI Projects Manager to determine whether it is viable for consideration by the project for Options Analysis. The team should document the deviation and the design criteria for the non-standard element in the Project Report for Options Analysis. See GSI Manual, Volume III: Design Phase for more information.

In addition to deviations, document how other design factors inform Options Analysis. For example, existing service utilities might be replaced or designed around. In either case, state that "utility services will be replaced and costs have been captured" or "existing utilities will not be replaced and will inform bioretention cell location."

Concepts that should be submitted for SIP review:

- Deviations from Streets Illustrated
- BMPs that might significantly affect existing street use, such as realignment of road centerline, depaving a right-of-way, siting of curb bulbs
- Non-standard BMPs

Joint projects with SDOT should be routed for SDOT review via the SDOT PM.

Image: GSI in the Delridge neighborhood of Seattle

Datasheet Template

The Project Team should develop a project datasheet template (or equivalent) to document site-specific information gathered throughout the Options Analysis Phase and used to inform concept design and to provide the basis for evaluating options. The datasheets should reference any programmatic Basis of Design elements and document site-specific input from the areas of civil engineering, landscape architect, hydrogeological/geotechnical, and public engagement. Datasheets should be updated as information becomes available. A compiled datasheet should include the final concept design(s) and cost estimate(s).

See Appendix K for samples of past SPU datasheet templates.

4.1.6 Concept Plans and Documentation

Objective: Apply Basis of Design to Site-Scale Feasibility Maps to update BMP selection and identify preferred BMP locations along each block.

The Project Team should develop concept designs for each street selected from the Potential Sites step. Concept design is an iterative process to apply information from the Basis of Design and site-specific input (documented on datasheets or equivalent) to confirm the selected BMP(s) and identify the preferred BMP locations on each block. Depending on the options being evaluated, multiple concept designs may be developed for each street. Or, a single concept design might be refined depending on project goals. Concept designs should incorporate the following elements at a minimum.

Concept Plan Basemaps and Drafting

Depending on the quality of data available and project goals, the team should determine which base map and drafting software is appropriate for developing concept designs. Draft concepts may be more efficient using markup software such as Adobe® Illustrator or Bluebeam®.

For SPU-led CIPs:

The team should obtain a preliminary engineering resource composite (PERC) map from available City mapping (GIS and aerial photographs). This information can be pulled into AutoCAD, Adobe, or Bluebeam for schematically drafting concept layouts.

For WTD-led CIPs:

The team should use available GIS data to develop base maps. Include layers for high-resolution aerials, buildings, topography, utility layers provided by SPU including Seattle City Light (SCL), ditches and culverts, DWW mainlines and end points, DWW non-mainlines and points, water mains, water service lines, fire hydrants, NPDES outfalls, etc., franchise utilities (if available), ROW, and pavement.

Topographic Survey

Topographic survey data may be valuable to have for concept design development if the site has been determined for design (e.g., Longfellow partnership with SDOT sidewalk project). A topographic survey may also be warranted on sites with difficult grading, such as steep slopes or curbless streets. It is likely not needed for concept designs on streets with formal drainage.

Existing Conditions

The following existing conditions should be evaluated and documented to the level of detail and analysis as described below.

- Utility mains – Focus on mains that affect feasibility, such as water mains, large gas distribution mains, and underground power distribution.
- Utility services – Confirm that services (gas, water, side sewer, overhead) are depicted on base maps. Identify services that may have more significant impacts to adjust (for example, water meter vaults for fire and domestic services serving multiple units/businesses).
- Trees – Review existing trees in the areas proposed for bioretention and the associated infrastructure/improvements to help ensure that the concept design protects these mature trees. An arborist evaluation of existing trees is not required at Options Analysis; however, it is pertinent for the Landscape Architect to perform a review of root systems and/or canopies overhanging right-of-way.
- Parking/traffic studies – For BMPs that may impact parking, discuss with outreach team to ascertain public perception on parking and desire for traffic calming. If the concept design will impact movement

of vehicles, revise parking patterns or modify access to parking, then coordinate with SDOT traffic operations through the agency Project Manager to consider options.

- Existing drainage issues – Review data compiled from SPU drainage database for reports of drainage issues within the project study area. Also, consider collecting anecdotal observations from residents using a questionnaire about soil conditions, general nuisance ponding, water seepage into basements from ground water or other conditions, current or historical presence of springs, high groundwater issues, use of sump pumps, water in meter boxes/vaults in ROW, and presence of soggy soil.
- Infiltration – After the Stage 1 Evaluation, deep versus shallow infiltration technique or infiltration infeasibility should be identified. After Stage 2 Evaluation, preliminary infiltration rates should be recommended for preliminary facility sizing.
- Total contributing area – Use topography for area delineation and confirm with field observations during rain events (such as contributions from neighboring streets/alleys, curb discharge and observed flow patterns).
- Effective Impervious Area (EIA) – See guidance in GSI Manual, Volume III: Design Phase or use a calibrated model for project-specific scaling factors.
- Preliminary sizing – Include additional area for bioretention and space for the associated infrastructure (e.g., pre-settling zone and piping) to allow for buffer in anticipation for future conflicts, adjustments to siting of cells, and/or changes to meet performance goals.
- Partnership – Review partnership goals and site selections with all partners.

Concept Design Plans and Planning-Level Construction Cost Estimates

At a minimum, the concept design plans should demonstrate:

- BMP footprint, cross-section, discharge technique (including conveyance, if needed), new street trees, schematic layout of associated infrastructure (e.g., underdrains, maintenance holes, and future sidewalk/road width), and preferred location on the block
- Other proposed features, including sidewalk and curb ramp locations, walls, and road edge treatments (curb and gutter, asphalt thickened edge, etc.).
- Applicable sizing and/or performance metrics (e.g., contributing EIA and sizing factor used)
- Utility, tree, and/or parking impacts noted
- Design deviations

The Concept Designs as described in this section are intended to be technical work products for engineering review and cost estimating. If the Public Engagement Plan includes sharing concepts with the public for input, an outreach version of the concepts should be developed. See Section 4.1.9 for discussion and examples.

Concept Designs expected to progress as options being considered should have an associated planning-level construction cost estimate for budgeting. For both SPU and WTD-led projects, a Class 4 cost estimate (per the Association for the Advancement of Cost Engineering International) is required for the Options Analysis Phase. The SPU and WTD joint GSI program developed a construction budget estimating tool for the Initiation and Option Analysis phases. The GSI Construction Budget Estimating Tool is a Microsoft™ Excel spreadsheet and can be used as a starting point in developing and documenting assumptions for construction budgets for roadside bioretention retrofitted into Neighborhood Yield streets. Contact the SPU GSI Projects Manager for a copy of this tool and user guide.

For large-scale projects, the Project Team may use parametric cost estimating using past projects.

See Appendix L for example Concept Plans and the GSI Construction Budget Estimating Tool User Guide.

4.1.7 Revised Site Selection Map

Objective: Continue documentation of sites still being considered.

If any of the additional detail developed for concept designs renders a site infeasible, the team should consider updating the Site Selection Map.

4.1.8 Interdepartmental Review

Objective: Confirm basis of design and resolve conflicts with interdepartmental infrastructure or objectives.

Concept Plans should be reviewed by appropriate groups in an interdepartmental review. This includes any partners that are being considered at this point of analysis.

Image: GSI in Seattle

4.1.9 Outreach for Refinement of Potential Sites

Objective: Visit neighbors, share information, and request input to inform the selection of potential sites (this step of outreach may depend on model of interaction).

The Project Team shall maintain relationships in the neighborhood. It is especially important if Outreach for Potential Sites (Section 3.2.1) was not conducted, or if more input is needed to inform the team's evaluation of the options. This activity provides an opportunity for an update or refinement of potential concepts. Planning and preparation for this event would be similar to the guidance provided in Section 3.2.1 for Outreach for Potential Sites.

4.2 Develop, Evaluate and Recommend Preferred Option

Once the Concept Plans and datasheets have been developed with input from and coordination with geotech, the public, and interdepartmental reviewers, the Project Team should evaluate the options defined in Section 4.1.2 based on the criteria established in Section 4.1.3. In general, the workflow consists of evaluating and recommending the preferred option and conducting a Management Briefing.

4.2.1 Evaluate and Recommend Preferred Option

Objective: Develop each option and apply evaluation criteria to recommend the preferred option.

At this point, the Project Team should select the preferred concept for each site and build two to four options based on the project goals, feasibility, agency-specific elements for determining the preferred option, performance evaluation, and feedback gathered during public engagement. For developing a project's construction budget estimate, both hard and soft costs should be included. Soft costs will be determined by the SPU/WTD PM using the agency's internal standards. For developing and documenting assumptions for hard costs, the Project Team can start with the GSI Construction Budget Estimating Tool and tailor it to the specific project elements along with the following:

Image: GSI in the Delridge neighborhood of Seattle

- For SPU-led CIPs, the Project Team should use SPU's cost estimating guide as a reference (available at http://www.seattle.gov/util/Engineering/Consulting_Resources/CostEstimatingGuide/index.htm).
- For WTD-led CIPs, the Project Team should follow WTD's latest cost estimating guide available by request.

Recommend the preferred option by:

- Evaluating the options against the criteria rating system (Section 4.1.3)
- Considering planning level cost estimates (including construction, total project, and life cycle/O&M)
- Considering input from potential partners and the public

Once a preferred option has been selected, the team should document relevant sections in the Project Report.

Project-Specific Considerations

GSI CIPs for CSO performance should perform system modeling to confirm performance of the preferred option.

4.2.2 Management Briefing

Objective: Review the recommended preferred option to confirm proposed project will meet project goals.

Once the project team has recommended a preferred option, Project Management (LOB for SPU-led projects, agency Project Manager for WTD-led projects) should brief agency management and solicit input for option refinements. This includes confirmation that the preferred option meets budget, performance, and schedule requirements per the Initial Scope Statement (SPU)/Initial Project Charter (WTD). Project Management should also continue to coordinate partnerships as needed to determine whether option refinements are needed. If the project is anticipated to obtain Stage Gate 2 approval, start request to change an existing contract (SPU)/ negotiations (WTD) for contract amendment.

Design Consultant Procurement

If the design consultant team will transition to the design phase, start the contract amendment process if Stage Gate 2 approval is anticipated.

Procurement, selection, scoping, and contracting should be carried out in accordance with each agency’s respective processes.

Section 5

Final Sites and Concepts

In this final step of Options Analysis, refinements are made, Partnership Agreements are pursued, a Final Site Selection Map is developed, and the project is prepared to move through Stage Gate 2. The process is documented in a Project Report for Options Analysis, the SEPA may be published, and outreach for the preferred option is conducted. Finally, the Options Analysis Phase is closed out and the project is handed to the design team. The subsections below describe the process for refining and documenting the results of Options Analysis.

Figure 8 provides an overview for the activities related to this step of Options Analysis. Each activity is described in more detail below.

Figure 8 Final Sites and Concepts Workflow

5.1 Select Preferred Option

Revisions to the preferred option recommended to management may require final refinements.

5.1.1 Preferred Option Refinement

Objective: Revise concept designs and/or options as necessary and finalize for Stage Gate materials.

The Project Team should finalize the concept designs/options and associated cost estimates as needed based on SPU/WTD technical review, hydrogeological/geotechnical exploration, and public engagement input. The team should summarize how the recommended option meets the required criteria and goals for the project as stated in the Initial Scope Statement (SPU) / Initial Project Charter (WTD) (Section 2.1.1), including any modeling for confirming performance of the preferred alternative. The team should identify any risks and data gaps that could impact the current design and recommend follow-up actions, including revising options and incorporating revisions into final design. Follow-up actions should be documented in a decision log. The Site Selection Map should be finalized for SPU/WTD management and public outreach, if needed.

5.1.2 Partnership Agreement

Objective: Solidify partnership opportunities by documenting partnership agreements via project-specific MOAs and MOUs.

If an identified partnership opportunity is viable for the preferred option and involves cost-sharing agreements, project-specific MOAs/MOUs should be drafted per each agency's legal protocols and routed through appropriate review channels.

For SPU-SDOT partnerships; use the SPU MOA #17-138-A as a model and develop a project-specific MOA. Guidance for working with the SPU contracts group is available internally at the following link: https://seattlegov.sharepoint.com/sites/SPU-T1/CPD/SitePages/Agreements.aspx

Image: Curb bulb in the Delridge neighborhood of Seattle

For SPU-led CIPs, the LOB representative should continue to coordinate with the SPU Water LOB for opportunistic replacements and coordinating intersecting work. Additionally, GSI constructed in the ROW by SPU is not subject to a Term Permit because of the O&M MOA specifying ownership and maintenance of facilities and their components.

5.1.3 Final Site Selection Map

Objective: Document final sites selected and recommended for the design phase.

The Project Team should finalize the Site Selection Map based on option refinements.

5.1.4 Public Engagement Report for Options Analysis

Objective: Prepare report summarizing public engagement and findings gathered during Options Analysis to provide guidance for updating the PEP for Design Phase.

The Public Engagement Lead should manage the compilation of the Public Engagement Report for the project's Options Analysis Phase. This report should follow each agency's standards for documenting engagement and public comments. For reference on future GSI projects, the report should include all Outreach Materials that were shared with the public and include a description of the purpose that the graphics, images, drawings, and maps were intending to convey to the public.

5.1.5 Stage Gate 2

Objective: Prepare documentation to carry the recommended option through SPU's Stage Gate 2 for the Business Case and through WTD's Stage Gate 2.

At this step, the project team should brief SPU/WTD management on the recommended option and conduct a closeout meeting. The briefing package should include:

- Summary of feasibility analysis
- Summary of public outreach
- Anticipated performance levels and cost of each option
- Results of the planning-level risk register
- Basis for recommended option

SPU-led CIPs

The SPU Project Manager should review the recommended option to confirm there are no conflicts or opportunities with the water line of business. The SPU PM should schedule meetings to rewrite the Initial Scope Statement as the Scope Statement based on details developed for the recommended option. The Scope Statement should include the problem/opportunity, performance requirements, the initial schedule, project costs, staffing needs, and staff roles and responsibilities.

The team should complete economic analysis appropriate for the project, according to SPU methodology for Triple Bottom Line (TBL) analysis. TBL includes consideration for environmental, social, and financial costs and benefits. Guidance on the economic analysis for SPU projects is provided in SPU's Project Management Methodology document (2016, or most current), available to SPU staff via Sharepoint. Completing the economic analysis requires developing a draft schedule, tasks, and budget and may require consulting with an economist.

With the results of the economic analysis, complete the SPU Stage Gate 2 form, which documents the Business Case for the project (http://spu-sharepoint/StageGate/default.aspx).

WTD-led CIPs

The team should complete economic analysis appropriate for the project according to WTD methodology. The Alternatives Analysis economic analysis includes draft life cycle cost analysis and updated project budget, costs estimate (planning phase level), and contract level annual cash-flow forecast.

5.2 Closeout of Options Analysis Phase

The Options Analysis Phase for a project ends upon the completion of Stage Gate 2. Upon completion, the Project Team should conduct a closeout meeting. Participation in the closeout meeting and input on lessons learned from the Options Analysis Phase should be gathered from team members, including the designers and subject matter experts (i.e., landscape architects, civil engineers, community relations representatives, geologists/hydrogeologists, geotechnical engineers, modelers, project managers, and operations and maintenance representatives), and documented in meeting notes.

5.2.1 Project Report for Options Analysis

Objective: Prepare Project Report summarizing work completed for Options Analysis for determining the option and selecting project for design.

Once the project passes through Stage Gate 2 and the preferred option is selected (approval of the SPU's Business Case), the Project Team should compile all relevant and available sections of the Project Report related to work done during Options Analysis. A Project Report outline template is provided in GSI Manual, Volume III: Design Phase, Appendix C. The Project Report should be started in Options Analysis and carried forward into the Design Phase to document the analyses and decisions. The Project Report contains the basis of design, project budget, hydrogeologic assessment, draft geotechnical assessment, windshield survey review, feasibility review/datasheets, concept options and selection criteria for the preferred option, public engagement report and outcomes, and other analyses completed during the Options Analysis phase. During the Design Phase, the Project Report will be amended to document the work completed for the final design.

5.2.2 Inform Neighborhood about Site Selection

Objective: Share information about selected sites.

Once the project passes through Stage Gate 2 and the project scope for the design phase is confirmed, the Project Team may decide to notify the selected sites prior to start of the Design Phase — or wait until after the start of the Design Phase. The Project Team shall discuss timing of the notification to the community. If done at the end of Options Analysis, key project decisions, changes, or modifications to scope (from what was previously provided to the community, if applicable) may be shared with the public to provide smoother and more efficient public engagement for the Design Phase. If the Project Team changes during the progression of the work into Design Phase or 30% design, then it might work better to

Encroachments, Parking and Driveways

The Project Team shall consider when to inform the community about encroachments, changes to parking and driveway access. Consult with SDOT representative on the project to help communicate City policy, if applicable. Discussion of this topic may be more suited after 30% design, when more decisions have been made regarding the scope of the improvements on a block.

do the notification in the Design Phase. The Public Engagement Lead should plan and implement community outreach to:

- Continue to raise awareness and inform the community about the project
- Ensure neighbors know about the problem
- Identify sites that are being designed and explain why
- Demonstrate how community input influenced the project decision
- Describe project next steps, as well as the overall schedule for the design phase and construction

5.2.3 Transition to Design Phase

Objective: Reflect on Options Analysis, document lessons learned, and transition to Design Phase.

As the Project Team looks back over the work and scope of the Options Analysis Phase, they should follow agency procedures for closeout meetings. Suggested discussion topics for reviewing lessons learned include:

- What worked well during the Options Analysis Phase?
- What could have been done differently and why?
- How did the interdisciplinary interaction work? How could roles improve?
- What were the lessons learned?
- How did the departments/divisions/agencies work together?
- What would you change in the consultant scope of work?
- What can be improved on community interaction? What would you change in the consultant outreach scope of work?
- How much technical information was shared with the community and when? Was this an appropriate approach? Were there other Outreach Materials that would have been helpful?
- Was the right information gathered at the right time of analysis? For example, was the correct amount of utility data/record data retrieved at an appropriate time?
- Was the appropriate number of sites/blocks initially considered? Did this result in an acceptable number of sites to develop options and meet project goals? For example, were too many sites evaluated or is another round of analysis needed to find more sites?
- What are your recommendations for streamlining the process?

Following the team's closeout meeting, a meeting should be held with the SPU GSI Projects Manager and GSI program staff to review comments from the closeout meeting discussion, recommend actions, and assign a responsible party for follow-up.

Section 6

References

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Seattle Public Utilities. Design Standards & Guidelines. Available at: https://www.seattle.gov/util/Engineering/DSG/index.htm

Streets Illustrated, Seattle's Right-of-Way Improvements Manual. Available at: http://streetsillustrated.seattle.gov/

Appendix A: SPU SDOT Partnership Documents

- SPU-SDOT MOA for Allocation of Costs on Joint Sidewalk and Green Stormwater Infrastructure Projects (SPU MOA #17-138-A)
- SPU-SDOT Partnership Memo and flowchart (SPU NDS Partnering Program)
- Broadview TM for sidewalk and bioretention concepts

Memorandum of Agreement
Between
Seattle Public Utilities (SPU #17-138-A)
And
The Seattle Department of Transportation
For
Allocation of Costs on Joint Sidewalk and Green Stormwater Infrastructure Projects

This Memorandum of Agreement ("Agreement") is made by the Seattle Public Utilities Department ("SPU"), and Seattle Department of Transportation ("SDOT"). SPU and SDOT may be referred to in this Agreement as a "Party" or collectively the "Parties."

1. PURPOSE

WHEREAS, SDOT plans to construct 250 blocks of new sidewalk between 2016 and 2024 as part of the Move Seattle levy; and

WHEREAS, the City of Seattle ("City") received approval in August 2015 for The Plan to Protect Seattle's Waterways, which includes the commitments of the July 2013 Consent Decree, by the Washington State Department of Ecology ("Ecology") and the United States Environmental Protection Agency ("EPA") to fulfill their obligations under the Clean Water Act that includes implementing Green Stormwater Infrastructure ("GSI"); and

WHEREAS, City Council ("Council") Resolution 31459 established GSI as a critical aspect of a sustainable drainage system, and in combination with an associated Executive Order 2013-01 set a city-wide implementation target to manage 700 million gallons of runoff annually with GSI by 2025; and

WHEREAS, lack of sidewalks and formal drainage frequently occur in the same areas in the City; and

WHEREAS, SDOT and SPU wish to construct as many sidewalk and GSI facilities as possible with their available funding; and

WHEREAS, co-locating sidewalk and GSI projects results in reduced project costs to SDOT and SPU compared to delivering the sidewalk and GSI projects separately; and

WHEREAS, SDOT's funding sources generally stipulate that funds shall be spent on transportation system improvements; and

WHEREAS, SPU is required to use rate-payer funds on utility-related infrastructure, operations, and maintenance costs;

NOW THEREFORE, this Agreement defines SDOT's and SPU's approach to allocating costs on joint sidewalk and GSI projects that is predictable and transparent and meets regulatory and funding source requirements for use of funds and that will result in reduced project costs, efficiencies, soft cost reductions and improved project design.

2. BACKGROUND

There are several key City initiatives that led to the decision to develop a joint sidewalk and GSI project agreement. SPU began installing GSI in the right-of-way ("ROW") in 1999. The Long Term Control Plan and the Integrated Plan, The Plan to Protect Seattle's Waterways, approved by Ecology in 2015 to address combined sewer overflows, and Council Resolution 31459 approved in 2013 to manage 700 million gallons of stormwater runoff using GSI by 2025, include commitments to construct GSI facilities in the ROW.

Walking is the fastest growing mode of transportation in Seattle. Between 2009 and 2015, the number of people walking to work rose from 27,300 to 43,500. While several Seattle neighborhoods have a pedestrian-friendly business district, many areas of the city lack sidewalks or other pedestrian infrastructure and have few accessible destinations. Approximately twenty six percent of the blockfaces in the city have no sidewalks at all. The Bridging the Gap levy passed by Seattle voters in 2006, and its successor, the Move Seattle levy passed by the voters in 2015, include funding to build sidewalks, and the adopted 2017 Pedestrian Master Plan provides the framework and objectives for investing the levy funding.

Some of the areas of the city that SPU has selected to implement GSI to manage stormwater coincide with areas where sidewalks do not exist. Additionally, areas that are prioritized by the Pedestrian Master Plan, Bike Master Plan, and Safe Routes to School Program also may lack formal surface water collection and conveyance systems. SDOT and SPU recognize the benefits of combining these two types of projects where they can be co-located. Many project costs can be shared when the projects are combined resulting in lower per unit costs for sidewalks and GSI.

3. JOINT PROJECTS

The primary purpose of an SDOT sidewalk project is to provide a safe, and accessible walkway where none currently exists. An SDOT sidewalk project generally includes sidewalk, ADA-accessibility components (usually curb ramps), a planting strip to separate pedestrians from vehicular traffic, street trees, and curb or other edge treatment to provide a barrier to pedestrians and to convey stormwater where needed.

The primary purposes of an SPU GSI project are to manage stormwater using natural drainage systems, to improve drainage, and to provide the necessary conveyance infrastructure to connect new stormwater facilities to existing stormwater infrastructure where necessary.

A joint project must fulfill the primary purposes of a SDOT sidewalk project and a SPU GSI project within the same project area. Once a location for a joint project is identified SDOT and SPU determine the acceptable design standards and criteria for their assets. Once standards and service level criteria are established for each department's primary improvements, the project's configuration and design will be that which best meets both departments' criteria subject to funding availability and other constraints.

4. PROJECT COST COMPONENTS

All costs associated with completing a joint sidewalk and GSI project must be accounted for in the allocation of costs to SPU and SDOT. Categorization of all the project costs facilitates establishing a basis for how costs are allocated. Initially all the project costs go into one of two categories; Project Activities and Project Elements. Project Activities are the activities performed to deliver a project.

Project Elements include all materials used to construct a project and assets and features resulting from construction. Project activities and elements are more specifically defined as follows:

A. Project Activities. There are two types of activities; project design/delivery activities, and contractor activities. Project-design/delivery activities are performed by SDOT staff, SPU staff and their consultants. A list of project design/delivery activities is included in Attachment A. Construction activities are tasks and actions performed by the contractor upon a Notice to Proceed for which the contractor is reimbursed. Typically, contractor activities include items such as mobilization, traffic control, preparation of a critical path schedule etc. These activities are included in the bid item list for the project. They are listed in Division 100, General Requirements shown in Attachment B.

B. Project Elements. Generally, Project Elements include physical materials and assets used in and resulting from constructing the project. All Project Elements are included in the project bid item list in Division 200 and above. For cost allocation purposes, joint sidewalk and GSI Project Elements are further divided into two categories: Primary Elements and Secondary Elements.

   i. Primary Elements. Primary Elements are those assets that SPU and SDOT construct to improve pedestrian mobility and surface water management. SDOT's Primary Elements generally include a concrete or asphalt sidewalk, ADA-accessible curb ramps at legal street crossings, street trees, gutter, and a curb or other type of vertical separation between vehicles and pedestrians. SPU's Primary Elements include GSI facilities and new conveyance infrastructure added to connect GSI facilities to existing stormwater infrastructure.

   ii. Secondary Elements. Construction of sidewalk and GSI infrastructure results in construction impacts and permanent modifications to the ROW and private property within the project construction area. The existing affected elements are categorized as Secondary Elements for assessing cost allocation. Secondary Elements may include existing SDOT or SPU assets in the project area that are impacted by the project; assets that SDOT or SPU elect to replace or repair because they are in or proximate to the joint project area; existing assets owned by others that are impacted by construction; materials used within the project area for grading, site preparation and earthwork; and assets constructed to accommodate grade changes for the final project configuration. Secondary Elements are further subdivided for cost allocation purposes into Secondary ROW Elements and all other Secondary Elements called Secondary Other Elements.

      1. Secondary ROW Elements are assets located in the ROW owned by SPU Drainage and Wastewater (DWW) and SDOT that are impacted by or added to the primary sidewalk and GSI project elements. Secondary ROW Elements also include materials that SPU DWW and SDOT specify for use in construction of one or more of their assets. Rock walls, curb walls and reinforced concrete walls used to permanently support SDOT or SPU DWW infrastructure in the ROW are also in this category.
      2. Secondary Other Elements are assets that provide access and service to adjacent private property and assets that are owned by a party other than SDOT and SPU DWW. This includes Seattle Public Utilities Water assets, Seattle City Light assets, franchise utility assets and private property owner assets. Secondary Other Elements also include driveways, rock walls, curb walls and reinforced concrete walls used to accommodate grade changes between the ROW and private property and landscape elements on private property.

5. COST ALLOCATION METHODS

SPU and SDOT must comply with various restrictions on the use of utility ratepayer funds and transportation funds. The cost allocation methods that follow are defined to allocate all sidewalk and GSI project activities and elements consistent with both department's funding restrictions.

A. Final Owner cost allocation. The cost is allocated to the department (SPU DWW or SDOT) that will own the asset after it is constructed. This allocation method applies to both department's Primary Elements. It also applies to both department's existing infrastructure that is impacted and subsequently restored or replaced as part of the project (Secondary ROW Elements).

B. Originating Department cost allocation. The cost is allocated to the department that requests inclusion of an item in the project. Typically, this type of item is an elective repair or replacement of existing infrastructure or new improvements that are not part of the joint project Primary Elements. This allocation method also applies to types of materials that either SPU DWW or SDOT specify to construct its assets such as base materials for SDOT assets and bedding materials for SPU DWW assets.

C. Project Specific cost allocation. Some bid items are not readily categorized without understanding how and why they are included in a project. These bid items are best allocated on a project specific basis. This allocation method has been assigned to all Standard Specification bid items identified as "Special" in the current version of the specifications. It also applies to bid items not included in the bid item list in Attachment B that are included on a joint project in the future.

D. Outside Party cost allocation. The cost is allocated to a party other than SPU DWW and SDOT. The outside party is typically another utility. Outside parties include SPU Water, Seattle City Light, and franchise utilities. An adjacent private property owner may occasionally be in this category.

E. 3 Party cost allocation. The cost is allocated by the ratio of the cost of each department's bid items in Division 200 and above, to the cost of all bid items in Division 200 and above excluding costs reimbursed by outside parties. This allocation generally applies to most project design/delivery activities, and construction activities in Division 100 bid items. The name "3 Party" comes from the MOA between SPU, SDOT, and SCL (3 Party) Public Asset Protection and Cost Sharing for Public Works Projects. The 3 Party MOA uses this method to allocate project management, construction management and Division 100 bid items when a second or third city department is constructing improvements as part of a lead department's project.

F. Proportional Area cost allocation. Proportional Area cost allocation allocates costs based on the proportion of area of each department's Primary Elements (Primary Area) to the total area of Primary Elements. Primary and Proportional Areas are calculated as follows:

   1. SDOT Primary Area: An area equal to the sum of the lengths of the sidewalk along each blockface on the project times a 12-foot width. The defined width is the standard distance, as described in Standard Plan 030 in the 2017 City of Seattle Standard Plans and Specifications, from the face of a curb to the back of a sidewalk. Short sections of sidewalk that turn the corner at the ends of blockfaces and miscellaneous improvements at either end of the project such as small sections of sidewalk across from the last block of joint improvements and companion curb ramps are excluded from the calculation.

2. SPU Primary Area: An area equal to the sum of the lengths of the GSI facilities and underground drainage and conveyance infrastructure within each blockface times the maximum width of GSI on each blockface, excluding GSI cells that are widened to take advantage of a curb bulb included to reduce the pedestrian crossing distance at a corner. The areas for all blocks of the joint project are summed to get the SPU Primary Area.
3. SDOT Proportional Area: SDOT Primary Area divided by the sum of SDOT and SPU Primary Areas.
4. SPU Proportional Area: SPU Primary Area divided by the sum of SDOT and SPU Primary Areas.

Proportional Area is used to allocate costs for many Secondary Elements because the quantities and costs of these elements are largely related to the amount of area disturbed by the project to construct the Primary Elements. Attachment C includes examples of how SDOT and SPU Primary and Proportional Areas are calculated.

6. JOINT SIDEWALK/GSI PROJECT COST ALLOCATION

Project Activities including project design/delivery activities shown in Attachment A, and construction activities in Attachment B; and Project Elements including Primary Elements, Secondary ROW and Secondary Other Elements listed in Attachment B constitute all costs to be allocated on a joint sidewalk and GSI project.

One of the six cost allocation methods in Section 5 is applicable to each cost item on a joint sidewalk and GSI project depending on its categorization as an activity or element and further subcategorization as Design/delivery or Construction Activity and Primary, Secondary ROW and Secondary Other Element. The allocation method assigned represents an allocation of cost for that item that is consistent with both department's funding restrictions.

The allocations of project design/delivery activities are listed in Attachment D. Generally, "common" design-related activities and project delivery activities for a joint project are allocated using the 3 Party allocation method. Design activities associated with SPU infrastructure are allocated to SPU as the Final Owner. Design acitivities associated with sidewalk and street design are allocated to SDOT as the Final Owner. When SPU or SDOT elect to add improvements outside of the scope of a joint sidewalk and GSI project, the department adding the improvement will be responsible for the cost of all project design/delivery activities for these improvements.

Attachment E lists the cost allocation method that applies to each standard bid item for which the contractor may be reimbursed on a joint sidewalk and GSI project. Contractor Activities in Division 100 bid items are allocated using the 3 Party allocation method. The remaining bid items that include all types of project elements are allocated using one of the methods in Section 5. The allocation method for each bid item is shown in Attachment E.

SPU and SDOT will reach agreement on allocation of all costs by 60 percent design. Specials and other bid items not shown in Attachment E will be allocated following the general principles outlined in Section 5 for the cost allocation methods. The allocation of all special and new bid items will be documented in a project-specific MOA.

The Lead Department will prepare an engineer's estimate of joint project costs at 30, 60, 90 and 100 percent design. Updated cost estimates will include revised estimates of SPU and SDOT Primary and Proportional Area when the primary elements have changed during design.

Following award of the construction contract SPU and SDOT will adjust the cost allocation to reflect the contractor's bid item unit costs. Final allocation of costs to SPU and SDOT will be based on actual quantities and costs submitted by the contractor and approved for payment.

SPU and SDOT will review the list of design and project delivery activities and the list of bid items attached to the Agreement on a 3-year cycle following publication of the updated City of Seattle Standard Plans and Specifications. The cost allocation tables may be amended by agreement of SPU and SDOT subject to changes in the Standard Plans and Specifications and consistent with restrictions on the use of utility and transportation funds.

7. PROJECT DELIVERY

SPU and SDOT agree that SDOT will typically be the Lead Department on a joint sidewalk and GSI project and will administer the construction contract. Standards for project delivery such as governance, project controls, consultant procurement, cost estimating, design and project delivery will follow the accepted standard practices of the Lead Department.

It is understood that both departments will have costs associated with project design/delivery activities during the project. Both departments will track these costs and the costs will be additive when determining the total cost of a project design/delivery activities to allocate to each department.

SPU and SDOT will agree on how the project design/delivery activities will be staffed. Specific roles and responsibilities for project delivery will be determined during the project development phase from 0 to 10 percent design. A project charter will be prepared by the Lead Department. The project charter will include the project team members and their respective roles and responsibilities. Changes to roles and responsibilities for project design/delivery may be made upon agreement of both departments.

SPU and SDOT will endeavor to adhere to the cost allocations included in this Agreement on all joint sidewalk and GSI projects. A project-specific MOA will be prepared for all joint sidewalk and GSI projects. The MOA will include reference to this Agreement as the basis for cost allocation, any exceptions to the cost allocation methods in this Agreement, and cost allocations of additional activities and elements not included in this Agreement. It will also include the scope of the joint project as well as a description of the scope of improvements that are the sole responsibility of one department. It will identify the Lead Department, project contacts, and the method for and terms of cost reimbursement.

When the project team determines that a deviation from the cost allocation method specified in this Agreement is warranted the project manager will prepare an explanation for the deviation. Deviations will be approved in writing by an SPU and SDOT Director.
All costs associated with SPU and SDOT improvements included in the project that are beyond the joint project blocks will be funded by the Originating Department. Generally, change order cost allocation will follow the allocation method for the bid item listed in Attachment E unless SPU and SDOT agree that an alternative approach is appropriate.

8. **SDOT PERMITTING**

SDOT may occasionally elect to designate SPU as the Lead Department. When SPU is the Lead Department SPU will obtain a simple utility permit from SDOT for the project. When SPU is the Lead Department or designated as the department responsible for design review in the project charter, SPU will manage the design review process and will use SDOT's list of design reviewers. When SPU is the Lead Department or designated department responsible for construction management, SPU will consult SDOT for a list of inspectors and inspections for SDOT assets. When SPU administers the construction contract the contractor will be required to obtain all necessary construction phase use permits. The construction phase permit requirements will be stipulated in the construction document General Requirements. SDOT will not collect ROW use fees when SPU is the Lead Department.

9. **TERM**

This Agreement shall begin on the date when all parties have signed it and shall end on January 1, 2024, unless amended by written agreement or terminated according to this Agreement.

10. **DISPUTE RESOLUTION**

The departments shall make their best efforts to ensure compliance with the terms of this Agreement. Additionally, staff will endeavor to work together to successfully execute this Agreement. If a situation arises which has not been identified in this Agreement the principal points of contact shall endeavor to come to an agreement as to a solution. If they cannot reach an agreement after two meetings within a time that does not adversely affect project schedule or cost and in all cases in less than two weeks' time, the dispute will be elevated to their respective managers. The managers will confer and determine the appropriate solution elevating the issue as necessary. The solution will be communicated in writing to the principal points of contact and affected staff will be informed of the decision.

11. **COMPLIANCE WITH LAW**

The Parties to this Agreement shall comply with all federal, state, and local laws.

12. **AMENDMENTS**

This Agreement shall not be amended or modified except in writing signed by the Parties.

13. **ENTIRE AGREEMENT**

This Agreement and any written Attachments constitute the complete agreement of the Parties, and any oral representations or understandings not incorporated are excluded.

The Parties have executed this Agreement by having their representatives sign below.

SEATTLE DEPARTMENT OF TRANSPORTATION		**SEATTLE PUBLIC UTILITIES**	
By	5/30/18	By	6·27·18
Signature	Date	Signature	Date
Goran Sparrman, Interim Director		Mami Hara, General Manager/CEO	

Attachments

- **A.** **Joint Sidewalk and GSI Project Design/Delivery Activities**
- **B.** **Joint Sidewalk and GSI Project Bid Items and Project Component Categorization**
- **C.1** **Primary and Proportional Area – Example 1**
- **C.2** **Primary and Proportional Area – Example 2 with a Curb Bulb**
- **D.** **Joint Sidewalk and GSI Project Design/Delivery Activity Cost Allocation**
- **E.** **Joint Sidewalk and GSI Project Bid Item Cost Allocation**

Attachment A.
Joint Sidewalk and GSI Project Design/Delivery Activities

Design Activities	Delivery Activities
DATA COLLECTION	PUBLIC ENGAGEMENT
SURVEY AND BASE MAP	PROJECT MANAGEMENT
STORMWATER TECHNICAL REPORT	ENVIRONMENTAL DOCUMENTATION
SIDEWALK/ROADWAY DESIGN	PERMITTING
DRAINAGE DESIGN	TEMPORARY CONSTRUCTION EASEMENTS
GSI DESIGN	PROPERTY ACQUISITION
COST ESTIMATING	CONSTRUCTION MANAGEMENT
SPECIFICATIONS	CONSTRUCTION INSPECTION
BID DOCUMENT PREPARATION	PROJECT CLOSEOUT
ROWIM AND CURB RAMP DEVIATION	
TESC DESIGN	

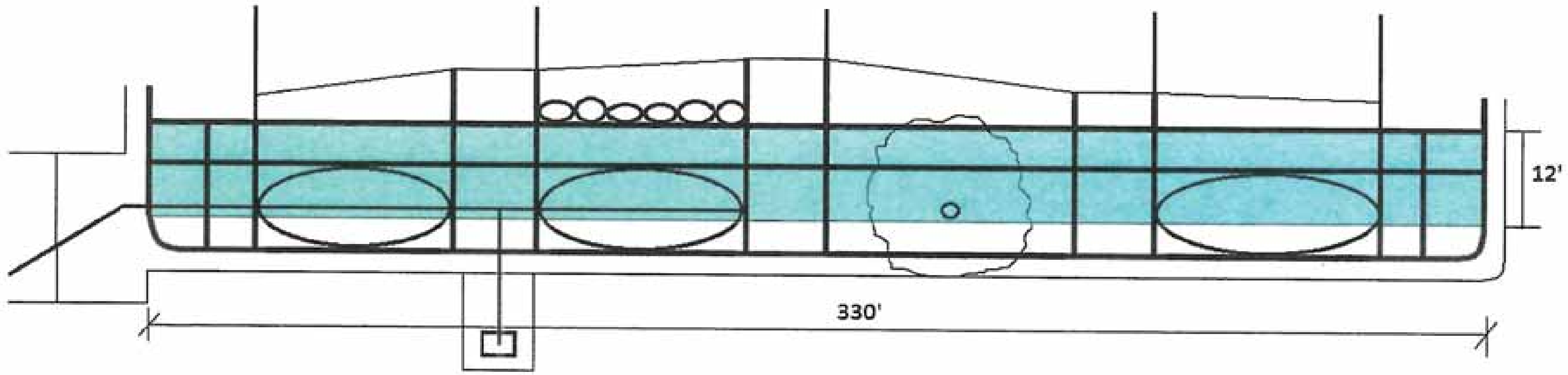
Attachment B.
Joint Sidewalk and GSI Project Bid Items and Project Component Categorization

Bid Item #	Bid Item Description	Type of Project Component
104	SCOPE OF WORK	Construction Activity
105	SURVEY	Construction Activity
106	APPROVALS	Construction Activity
107	LAW ENVIRONMENT	Construction Activity
108	CRITICAL PATH SCHEDULES	Construction Activity
109	MOBILIZATION	Construction Activity
110	TRAFFIC CONTROL	Construction Activity
201	CLEARING & GRUBBING	Secondary ROW Element
202	REMOVALS	Secondary ROW Element
204	EXCAVATIONS	Secondary ROW Element
205	DITCH AND CHANNEL	Secondary ROW Element
207	PROTECTIVE SYSTEMS	Secondary ROW Element
208	DEWATERING	Secondary ROW Element
209	SUBGRADE PREPARATION	Secondary ROW Element
210	BACKFILL	Secondary ROW Element
211	COMPACTION	Secondary ROW Element
212	WATERING	Secondary ROW Element
213	ROCK FACING	Secondary ROW & Other
215	GEOTEXTILES	Secondary ROW Element
216	DIRECTIONAL DRILLING	Secondary ROW Element
401	MINERAL AGGREGATES	Secondary ROW Element
401	MINERAL AGGREGATES 10,15,17	Secondary ROW Element
402	RECYCLED AGGREGATE	Secondary ROW Element
403	BASES SPECIAL	Secondary ROW Element
404	BALLAST & CRUSHED SURFACING	Secondary ROW Element
405	RECYCLED ASPHALT CONCRETE	Secondary ROW Element
406	ASPHALT TREATED BASE	Secondary ROW Element
407	RECLAIMED PAVEMENT MATERIAL	Secondary ROW Element

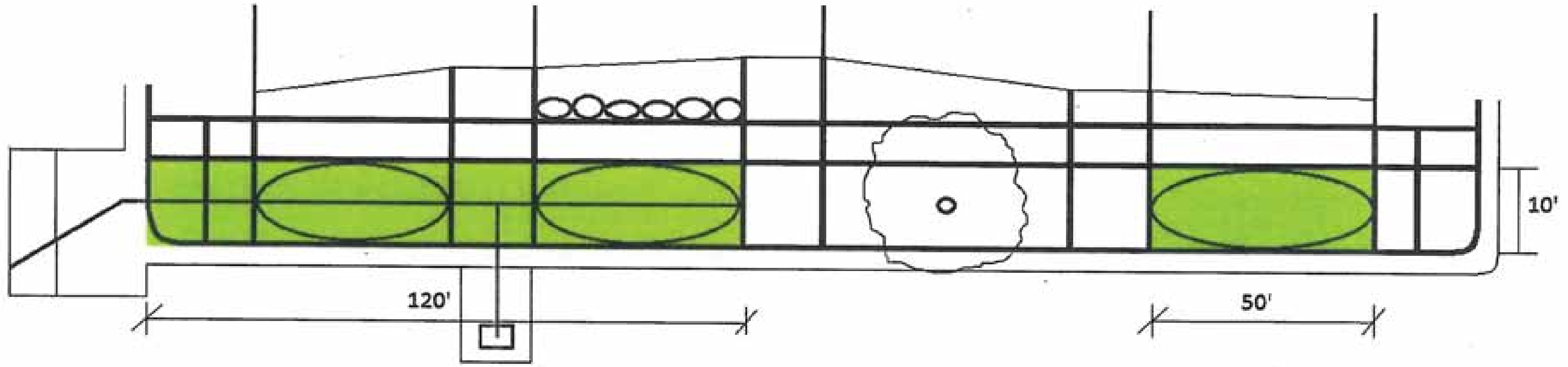
Bid Item #	Bid Item Description	Type of Project Component
504	ASPHALT CONCRETE PAVEMENT	Secondary ROW Element
505	CEMENT CONCRETE PAVEMENT	Secondary ROW Element
506	PERVIOUS SIDEWALK	Primary Element
601	STRUCTURES GENERAL	Secondary ROW & Other
602	CONCRETE STRUCTURES	Secondary ROW & Other
603	STEEL STRUCTURES	Secondary ROW Element
604	TIMBER STRUCTURES	Secondary ROW Element
605	PILES	Secondary ROW Element
606	BRIDGE RAILINGS	Secondary ROW Element
607	PAINTING	Secondary ROW Element
608	WATERPROOFING	Secondary ROW Element
609	MODIFIED CONCRETE OVERLAYS	Secondary ROW Element
610	CONCRETE BARRIER	Secondary ROW Element
611	REINFORCED CONCRETE WALLS	Secondary ROW & Other
701	DRAINS	Primary Element
702	CULVERTS	Primary Element
705	MANHOLES, CBS & INLETS	Primary Element
706	PIPE ANCHORS	Primary Element
708	PIPE CONNECTIONS	Primary Element
711	WATERMAIN PIPE	Secondary Other Element
712	WATERMAIN VALVES	Secondary Other Element
714	HYDRANTS	Secondary Other Element
715	WATER SERVICE CONNECTIONS	Secondary Other Element
716	FLOW CONTROL SYSTEMS	Primary Element
717	STORM & SANITARY SEWERS	Primary Element
718	SIDE SEWERS	Secondary Other Element
719	SEWER CLEAN OUT	Secondary ROW & Other
720	ADJUST UTILITIES	Secondary Other
721	BIORETENTION	Primary Element

Bid Item #	Bid Item Description	Type of Project Component
801	STORMWATER	Secondary ROW & Other
802	LANDSCAPING	Primary & Secondary Other
803	IRRIGATION	Secondary ROW Element
804	CEMENT CONCRETE CURB	Primary Element
806	EXTRUDED CURB	Primary Element
807	PRECAST CURB	Primary Element
808	LANE MARKERS	Secondary ROW Element
810	FLEXIBLE DELINEATOR POSTS	Secondary ROW Element
811	GUARD RAIL	Secondary ROW Element
812	FENCE	Secondary ROW & Other
813	MONUMENT CASES	Secondary ROW Element
814	CEMENT CONCRETE SIDEWALKS	Primary Element
815	RIPRAP	Secondary ROW Element
816	STAIRS & HANDRAIL	Secondary ROW Element
817	CURB WALL & SUPPORT	Secondary ROW & Other
818	STAIRS LANDINGS & STEPS	Secondary ROW Element
819	CONCRETE DRIVEWAY	Secondary Other Element
821	SIGNING	Secondary ROW Element
822	PAVEMENT MARKING	Secondary ROW Element
827	PROJECT ID SIGNS	Secondary ROW Element
830	LIGHTING	Secondary Other Element
831	SIGNALS	Secondary ROW Element
832	POLES & FOUNDATIONS	Secondary ROW Element
833	CONDUIT	Secondary ROW Element
834	LIGHT/ELECT SERVICE CONDUIT	Secondary Other Element

Attachment C.1
Primary and Proportional Area – Example 1



SDOT Primary Area is the length of the sidewalk on the blockface times a 12-foot width.
SDOT Primary Area = 330' x 12' = 3,960 square feet.

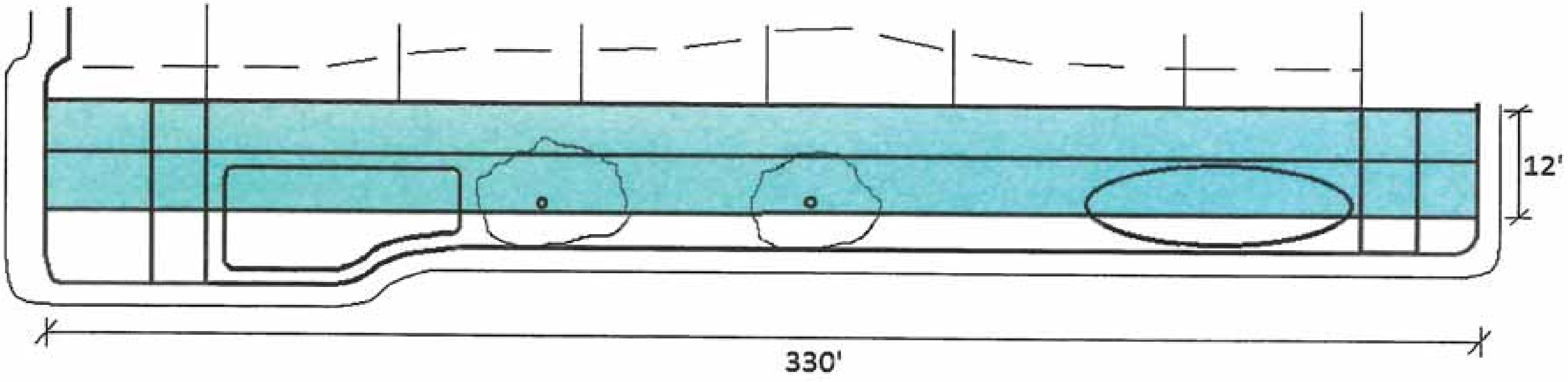


SPU Primary Area is the sum of the length of GSI and connecting conveyance on the blockface times the maximum width of the GSI on the blockface.
SPU Primary Area = (120' + 50') x 10' = 1,700 square feet.

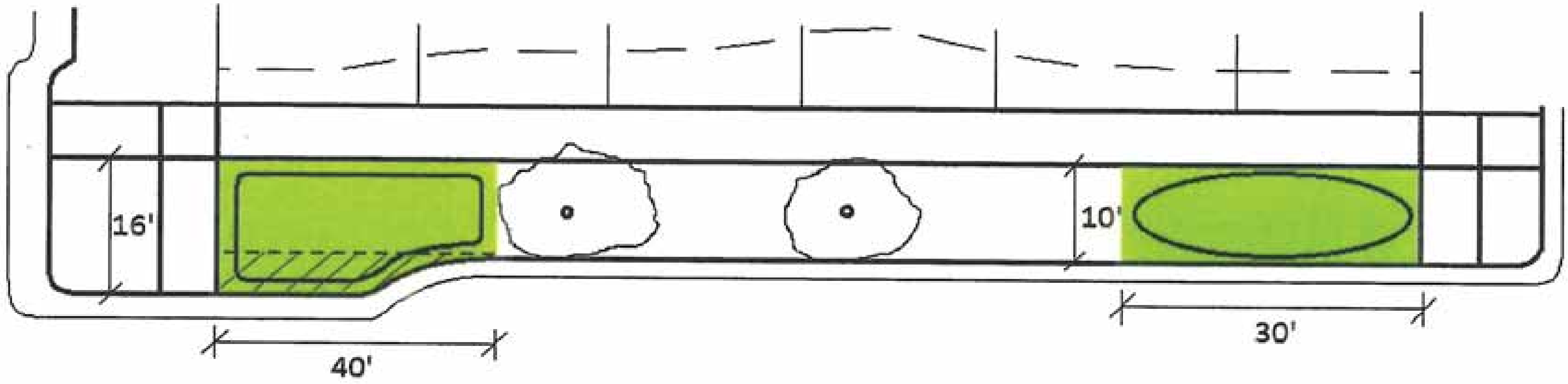
SDOT Proportional Area = 3,960 / (3,960+1,700) = 0.70
SPU Proportional Area = 1,700 / (3,960 + 1,700) = 0.30

Attachment C.2

Primary and Proportional Area – Example 2 with a Curb Bulb



SDOT Primary Area is the length of the sidewalk on the blockface times a 12-foot width. The width of the curb bulb is not included.
SDOT Primary Area = 330' x 12' = 3,960 square feet.



SPU Primary Area is the sum of the length of GSI and conveyance on the blockface times the maximum width of the GSI excluding the widened curb bulb width.
SPU Primary Area = (40' + 30') x 10' = 700 square feet.

SDOT Proportional Area = 3,960 / (3,960+700) = 0.85
SPU Proportional Area = 700 / (3,960 + 700) = 0.15

Attachment D.
Joint Sidewalk and GSI Project Design/Delivery Activity Cost Allocation

Design Activity	Cost Allocation Method
DATA COLLECTION	3 Party
SURVEY AND BASE MAP	3 Party
STORMWATER TECHNICAL REPORT	SPU
SIDEWALK/ROADWAY DESIGN	SDOT
DRAINAGE DESIGN	SPU
GSI DESIGN	SPU
COST ESTIMATING	3 Party
SPECIFICATIONS	3 Party
BID DOCUMENT PREPARATION	3 Party
ROWIM AND CURB RAMP DEVIATION	SDOT
TESC DESIGN	3 Party

Delivery Activity	Cost Allocation Method
PUBLIC ENGAGEMENT	3 Party
PROJECT MANAGEMENT	3 Party
ENVIRONMENTAL DOCUMENTATION	3 Party
PERMITTING	3 Party
TEMPORARY CONSTRUCTION EASEMENTS	3 Party
PROPERTY ACQUISITION	3 Party
CONSTRUCTION MANAGEMENT	3 Party
CONSTRUCTION INSPECTION	3 Party
PROJECT CLOSEOUT	3 Party

Attachment E.

Joint Sidewalk and GSI Project Bid Item Cost Allocation

Bid Item #	Bid Item Description	Cost Allocation Method
104	SCOPE OF WORK	3 Party
105	SURVEY	3 Party
106	APPROVALS	3 Party
107	LAW ENVIRONMENT	3 Party
108	CRITICAL PATH SCHEDULES	3 Party
109	MOBILIZATION	3 Party
110	TRAFFIC CONTROL	3 Party
201	CLEARING & GRUBBING	Proportional Area
202	REMOVALS	Proportional Area
204	EXCAVATIONS	Proportional Area
205	DITCH AND CHANNEL	Final Owner SPU
207	PROTECTIVE SYSTEMS	Originating Department
208	DEWATERING	Originating Department
209	SUBGRADE PREPARATION	Originating Department
210	BACKFILL	Proportional Area
211	COMPACTION	Originating Department
212	WATERING	Originating Department
213	ROCK FACING	Prop Area/Orig Dept[1]
215	GEOTEXTILES	Originating Department
216	DIRECTIONAL DRILLING	Originating Department
401	MINERAL AGGREGATES	Originating Department
401	MINERAL AGGREGATES 10,15,17	Proportional Area
402	RECYCLED AGGREGATE	Originating Department
403	BASES SPECIAL	Originating Department
404	BALLAST & CRUSHED SURFACING	Originating Department
405	RECYCLED ASPHALT CONCRETE	Final Owner SDOT
406	ASPHALT TREATED BASE	Final Owner SDOT
407	RECLAIMED PAVEMENT MATERIAL	Final Owner SDOT
504	ASPHALT CONCRETE PAVEMENT	Final Owner SDOT
505	CEMENT CONCRETE PAVEMENT	Final Owner SDOT
506	PERVIOUS SIDEWALK	SDOT/SPU[2]
601	STRUCTURES GENERAL	Final Owner SDOT
602	CONCRETE STRUCTURES	Prop Area/Orig Dept
603	STEEL STRUCTURES	Final Owner SDOT
604	TIMBER STRUCTURES	Final Owner SDOT
605	PILES	Final Owner SDOT
606	BRIDGE RAILINGS	Final Owner SDOT
607	PAINTING	Final Owner SDOT
608	WATERPROOFING	Final Owner SDOT
609	MODIFIED CONCRETE OVERLAYS	Final Owner SDOT
610	CONCRETE BARRIER	Final Owner SDOT
611	REINFORCED CONCRETE WALLS	Prop Area/Orig Dept
701	DRAINS	Final Owner SPU
702	CULVERTS	Final Owner SPU
705	MANHOLES, CBS & INLETS	Final Owner SPU
706	PIPE ANCHORS	Final Owner SPU
708	PIPE CONNECTIONS	Final Owner SPU
711	WATERMAIN PIPE	Outside[3]
712	WATERMAIN VALVES	Outside[3]
714	HYDRANTS	Outside[3]
715	WATER SERVICE CONNECTIONS	Outside[3]
716	FLOW CONTROL SYSTEMS	Final Owner SPU
717	STORM & SANITARY SEWERS	Final Owner SPU
718	SIDE SEWERS	Originating Department
719	SEWER CLEAN OUT	Originating Department
720	ADJUST UTILITIES	Originating Department
801	STORMWATER	Proportional Area
802	LANDSCAPING	Proportional Area
803	IRRIGATION	Originating Department
804	CEMENT CONCRETE CURB	Final Owner SDOT
806	EXTRUDED CURB	Final Owner SDOT
807	PRECAST CURB	Final Owner SDOT
808	LANE MARKERS	Final Owner SDOT
810	FLEXIBLE DELINEATOR POSTS	Final Owner SDOT
811	GUARD RAIL	Final Owner SDOT
812	FENCE	Proportional Area
813	MONUMENT CASES	Originating Department
814	CEMENT CONCRETE SIDEWALKS	Final Owner SDOT
815	RIPRAP	Final Owner SPU
816	STAIRS & HANDRAIL	Final Owner SDOT
817	CURB WALL & SUPPORT	Prop Area/Orig Dept
818	STAIRS LANDINGS & STEPS	Final Owner SDOT
819	CONCRETE DRIVEWAY	Proportional Area
821	SIGNING	Final Owner SDOT
822	PAVEMENT MARKING	Final Owner SDOT
827	PROJECT IDENTIFICATION SIGNS	Proportional Area
830	LIGHTING	Outside[4]
831	SIGNALS	Final Owner SDOT
832	POLES & FOUNDATIONS	Final Owner SDOT
833	CONDUIT	Final Owner SDOT
834	LIGHT/ELECT SERVICE CONDUIT	Outside[4]

[1] Proportional Area applies when the item is a Secondary Other Element. Originating Department applies when bid item is a Secondary ROW Element. One or both may apply.

[2] Pervious sidewalk is allocated 72 percent to SDOT and 28 percent to SPU

[3] Bid items that are reimbursed by SPU Water

[4] Bid items that are reimbursed by SCL

SPU NDS Partnering Program **Draft: November 7, 2019**
SPU/SDOT Partnering Framework

This document describes the Seattle Public Utilities (SPU) and Seattle Department of Transportation (SDOT) partnering-related items that need to be resolved as part of a joint SPU/SDOT project being delivered through SPU's Natural Drainage Solutions (NDS) Partnering Program or SDOT's sidewalk program.

Programmatic documents that govern and/or guide SPU/SDOT partnering, and are used as a basis for this partnering framework, include the:

- Memorandum of Agreement (MOA) #17-138-A between SPU and SDOT for Allocation of Costs on Joint Sidewalk and Green Stormwater Infrastructure Projects, June 27, 2018, (SPU/SDOT Cost Share MOA).

- MOA between SPU, SDOT and SCL for Public Asset Protection and Cost Sharing for Public Works Projects, August 25, 2016, (Tri-party Asset Protection MOA)

- MOA #17-058-A between SPU and SDOT for Maintenance and Operations of Green Stormwater Infrastructure Assets in the Public Right of Way, August 1, 2017, (SPU/SDOT GSI O&M MOA).

The three project-specific documents that guide partnership projects are described below. In general, each document would be prepared by the lead agency, with support from the secondary agency:

- **Project Charter**, which is required by Section 7 of the SPU/SDOT Cost Share MOA, establishes:
    - Over-arching purpose and expectations for the project, building off Section 3 of the SPU/SDOT Cost Share MOA
    - Project team members and their respective roles and responsibilities, including Project Manager and Design Representative (required to be included per the SPU/SDOT Cost Share MOA)
    - Go/no-go milestones for each agency – define point within project where each agency needs a firm commitment from other agency on project partnership, including funding
    - Design criteria that cannot be compromised by an agency (for example, SDOT sidewalk requirements, SPU bioretention area requirements, watermain offsets, etc.)
    - Requires the development of a Partnering Plan and a Project-Specific MOA

- **Partnering Plan**, which contains more detailed information on how the partnered project will be delivered. The Partnering Plan could be embedded as a chapter of the SPU or SDOT Project Management Plan and would be reviewed/updated in advance of major milestones. Approval of the Partnering Plan could be achieved by email from the SPU and SDOT project managers (how the Partnering Plan is updated would be established in the Project Charter). Specific information included:

    <u>Programmatic</u>

    - Change management process; for example, process for approval to changes to design concept
    - Process for reviewing and approving the plans for compliance with SPU design Standards and Guidelines, SDOT Streets Illustrated, Seattle Stormwater Code and Manual, City Standard Plans, GSI Design Manual and documenting deviations from any of these standards and other design decisions
    - Establish expectations/needs for design (e.g. what design items need to be addressed in 30% design, drainage report, etc.)

    - Coordinating with other City utilities and private utilities that may be impacted by secondary Department's work
    - Establish protocols and roles and responsibilities for construction phase for review of design changes

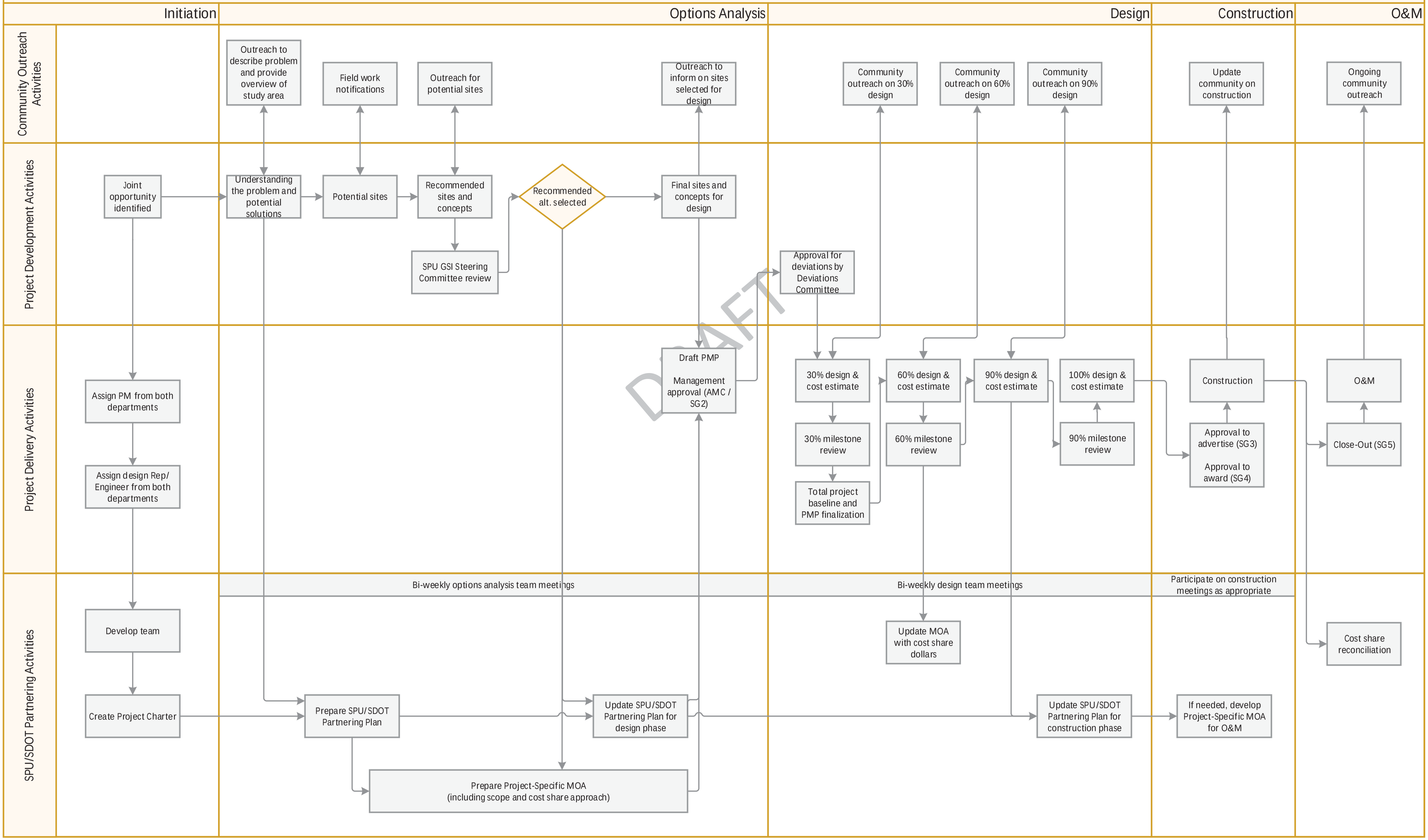
  <u>Project</u>

    - High-level project schedule, including milestones for development of a Project Partnership, completion of design, and completion of construction
    - Description of agreed-to design concept, and documentation of agreement of the concept and design criteria
    - Documentation of project commitments to the community, business, other Agencies, or Levy to Move Seattle
    - Managing and paying consultants
    - Public outreach and private property agreements for TCE's or access.
    - Expectations for primary and secondary agency construction management responsibilities (e.g. secondary agency's construction manager should be present full-time during the installation of their assets)

- **Project-Specific MOA**, which is required by Section 7 of the SPU/SDOT Cost Share MOA, includes:
    - Reference to the SPU/SDOT Cost Share MOA as the basis for cost allocations
    - Any exceptions to the cost allocation method in the SPU/SDOT Cost Share MOA
    - Cost allocations of additional activities and elements not included in the SPU/SDOT Cost Share MOA
    - Scope of the joint project
    - Description of the scope of improvements that are the sole responsibility to one department
    - Identify the Lead Department, project contacts, and the method for and terms of cost reimbursement
    - If an SDOT-led project, determine if the project will be delivered as part of the SDOT sidewalk design package, or as its own design package
    - References Project Charter and Partnering Plan for other items

SPU/SDOT Sidewalk/Bioretention Partnering Flow Chart

Updated 7/2/2019 - DRAFT



Draft
TECHNICAL MEMORANDUM

Date: April 30, 2019

To: Grace Manzano, Susie Walson, Don Anderson, and Wan-Yee Kuo, Seattle Public Utilities

Copy to: Tracy Tackett, Seattle Public Utilities
Bob Jacobsen, Brown and Caldwell

From: Meghan Feller and Alice Lancaster, Herrera

Lisa Corry and Liz Browning, Cascade Design Collaborative

Subject: 12th Avenue Drainage Improvements – Preliminary Assessment of Feasibility and Cost of SDOT Alternative Sidewalks (i.e., "Walkways") for Project GSI Blocks

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The Broadview 12th Avenue Drainage Improvements Project, located in Seattle's Broadview neighborhood (West Mohlendorph Creek basin), proposes to construct green stormwater infrastructure (GSI) in the public right-of-way to reduce flooding in downstream areas and provide water quality treatment for right-of-way runoff. These improvements will be constructed in conjunction with conveyance improvements and detention pipes in downstream areas of the basin. The roadside GSI improvements will include bioretention facilities with underdrains connected to underground injection (UIC) wells to facilitate infiltration of treated water into a deeper, permeable aquifer. The right-of-way condition is unimproved, with substandard streets (approximately 20 to 22 feet wide), informal (curbless/ditch/culvert) drainage, thrown streets, no sidewalks, and intermittent and informal paving to the right-of-way line. The streets currently under consideration for roadside bioretention are classified as Neighborhood Yield (curbless deviation) and Neighborhood Corridor (currently substandard and curbless).

This memorandum summarizes a preliminary feasibility and cost assessment for constructing pedestrian improvements on blocks where bioretention facilities are proposed. The alternatives considered would likely fall under Seattle Department of Transportation's (SDOT) guidance for "Walkways" under their Sidewalk Development Program (SDOT 2018a), or "Alternative Sidewalks" per Streets Illustrated (SDOT 2018b). For the purposes of this memo, these improvements will be referred to as "walkways."

While the roadside GSI improvements will most likely be located on the downslope side of the street, this memorandum evaluates the feasibility and cost of walkways constructed on either

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side of the street to capture the range of possible costs incurred when a walkway is added to a roadside GSI project.

The concepts presented herein will require review and approval from SDOT to ensure conformance with City requirements.

WALKWAY CONCEPTS

The walkway concepts presented herein are based on a roadside GSI concept, developed during Options Analysis, that includes bioretention facilities along Second Avenue Northwest from 127th Street to 130th Street (Concept 1; Block Selection Workshop, December 20, 2018). Existing grades along this block, and the other blocks being considered for roadside GSI, make it difficult, if not impossible, to ensure that all right-of-way runoff drains back to the roadway.

Three walkway configurations were evaluated for compatibility with roadside GSI along this block and are described below. Refer to Appendix A for a section rendering of each concept. These sections show a generic walkway section, representing a range of possible surfacing materials.

Concept 1A

Concept 1A represents the most likely roadside GSI and walkway configuration. In this concept, the GSI is located on the downslope side of the street to maximize drainage area captured. The walkway is located on the upslope side of the street, opposite the proposed bioretention facilities, resulting in minimal required regrading to construct the walkway. Improvements include removal of informal paved areas on the upslope side of the street, construction of a 5-foot-wide walkway, restoration of the de-paved area with tree planting and lawn, and partial reconstruction of driveways within the right-of-way.

Concept 1B

Concept 1B represents a hypothetical, though less desirable, configuration whereby, due to siting constraints (e.g., water main), the roadside GSI must be sited on the upslope side of the street. As a result, the walkway is constructed opposite the proposed bioretention facilities on the downslope side of the street. This concept assumes the right-of-way west of the roadway would be regraded to allow the walkway, and as much pervious area as possible, to drain back to the road. Improvements include removal of informal paved areas and driveways on the downslope side of the street, regrading to facilitate walkway drainage back to the street, construction of a 5-foot-wide walkway, restoration of the de-paved area with tree planting and lawn, and reconstruction of driveways within the right-of-way.

Concept 1C

Similar to Concept 1B, Concept 1C includes a 5-foot-wide walkway and standard planting strip on the downslope side of the street, opposite the proposed bioretention facilities. This concept, however, assumes the right-of-way downslope of the street would not be regraded, allowing the walkway and pervious areas to drain onto private property. Improvements include removal of informal paved areas west of the roadway, construction of a 5-foot wide walkway, restoration of the de-paved area with tree planting and lawn, and partial reconstruction of driveways within the right-of-way.

Concept 1D

Similar to Concept 1B and 1C, Concept 1D also represents a hypothetical, though less desirable, configuration whereby, due to siting constraints (e.g., water main), the roadside GSI must be sited on the upslope side of the street. However, in Concept 1D, the walkway is constructed on the same side of the street as the bioretention facility to evaluate the cost implications of the reduced disturbance area. This concept includes a vertical curb and 5-foot-wide walkway on the upslope side of the street, between the road edge and proposed bioretention facilities. The walkway is sited immediately adjacent to the street (rather than along the other side of the bioretention) to avoid a water main conflict with the bioretention cells. To accommodate the walkway and bioretention on the same side of the street, the roadway centerline would shift approximately 5.5 feet to the west.

This concept includes some minimal improvements on the downslope side of the street to improve drainage and formalize parallel parking. These improvements include installation of a thickened edge or berm (cost included in base project costs), removal of informal paved areas to the west of the designated parking lane, restoration of the de-paved area with tree planting and lawn, and reconnection of driveways (assume 5 feet of driveway replacement from new edge of roadway).

WALKWAY COSTS

For each of the concepts described above, we developed a rough-order-of-magnitude cost estimate, representing the anticipated additional cost to construct one long block (approximately 660 feet) of walkways when built in conjunction with roadside bioretention. Note that each concept includes costing information for five different surfacing materials: concrete, pervious concrete, crushed gravel, flexible porous surface treatment, and HMA. Table 1 presents a summary of per-block costs for the two most likely surfacing materials, crushed rock and HMA. The surfacing materials presented herein would require review and approval from SDOT to ensure conformance with City requirements.

Table 1. Walkway Concept Cost Comparison[a]

	Source/ Notes	1A		1B		1C		1D	
		HMA[b]	Crushed Rock[c]	HMA[b]	Crushed Rock[c]	HMA[b]	Crushed Rock[c]	HMA[b]	Crushed Rock[c]
Additional Cost for Pedestrian Improvements	Appendix B	$116,900	$107,400	$123,900	$114,400	$85,200	$75,700	$144,900	$135,400
Bioretention Retrofit Costs, Rounded[d]	Appendix C	$1,034,800							

[a]. Costs presented as rough order of magnitude costs to retrofit one long block (approximately 660-feet) of right-of-way with bioretention and pedestrian improvements.

[b]. Assumes 5-foot-wide, 3-inch-thick hot mix asphalt section placed over 4 inches of gravel base per Seattle Standard Plan 425.

[c]. Assumes 5-foot-wide, 4-inch thick section of 1/4 minus crushed rock (non-standard sidewalk) material.

[d]. Cost of bioretention retrofit assumed to be independent of walkway concept (for this project, the difference in cost of building bioretention on the upslope vs. the downslope side of the block is estimated to be within 2 percent).

The costs presented in Appendix B represent the sum of construction line-item pricing for these additional items per the SPU Cost Estimating Guide (SPU 2017). These costs include a 20 percent contingency and 25 percent allowance for indeterminates for consistency with the Preliminary Options Analysis Cost Estimate for the green blocks, submitted as part of the grey 30 percent design Basis of Estimate of Probable Cost (Brown and Caldwell 2019). An updated version of the Preliminary Options Analysis Cost Estimate for the green blocks is provided in Appendix C. This estimate was updated subsequent to the grey 30 percent costing effort to better reflect the costs associated with the bioretention improvements only (previous iterations carried a placeholder cost for pedestrian improvements). Costs do not include any soft costs, City contingency or management reserves, inflation, or escalation.

WALKWAY CONCEPT COMPARISON

Table 2 includes a comparison of the walkway concepts evaluated as part of this work. This section is intended to highlight the benefits and drawbacks of each alternative beyond the cost implications described in Appendix B.

Table 2. Walkway Concept Comparison.

Benefit	1A	1B	1C
Provides equitable drainage improvements and parallel parking on both sides of street	X	X	X
Consolidates major construction to one side of street	X		
Walkway drains to roadway (no concern about new impervious right-of-way surfaces draining to private parcels)	X	X	
Maintains standard roadway centerline alignment		X	X
Walkway set back from roadway edge by vegetated buffer (planting strip)		X	X
Does not include vertical curb and gutter (better maintains existing neighborhood character)		X	X
No significant grading to facilitate walkway construction	X		X
Requires fewer modifications to existing driveways as a result of walkway improvements	X		X
Maintains 5-foot-minimum horizontal separation of walkway from water main		X	X
Formalizes right-of-way and parking areas, increasing pedestrian safety and traffic calming	X	X	X

REFERENCES

Brown and Caldwell. 2019. 12th Avenue Drainage Improvements 30 Percent Design Completion – Basis of Estimate of Probable Cost Memorandum. February 13.

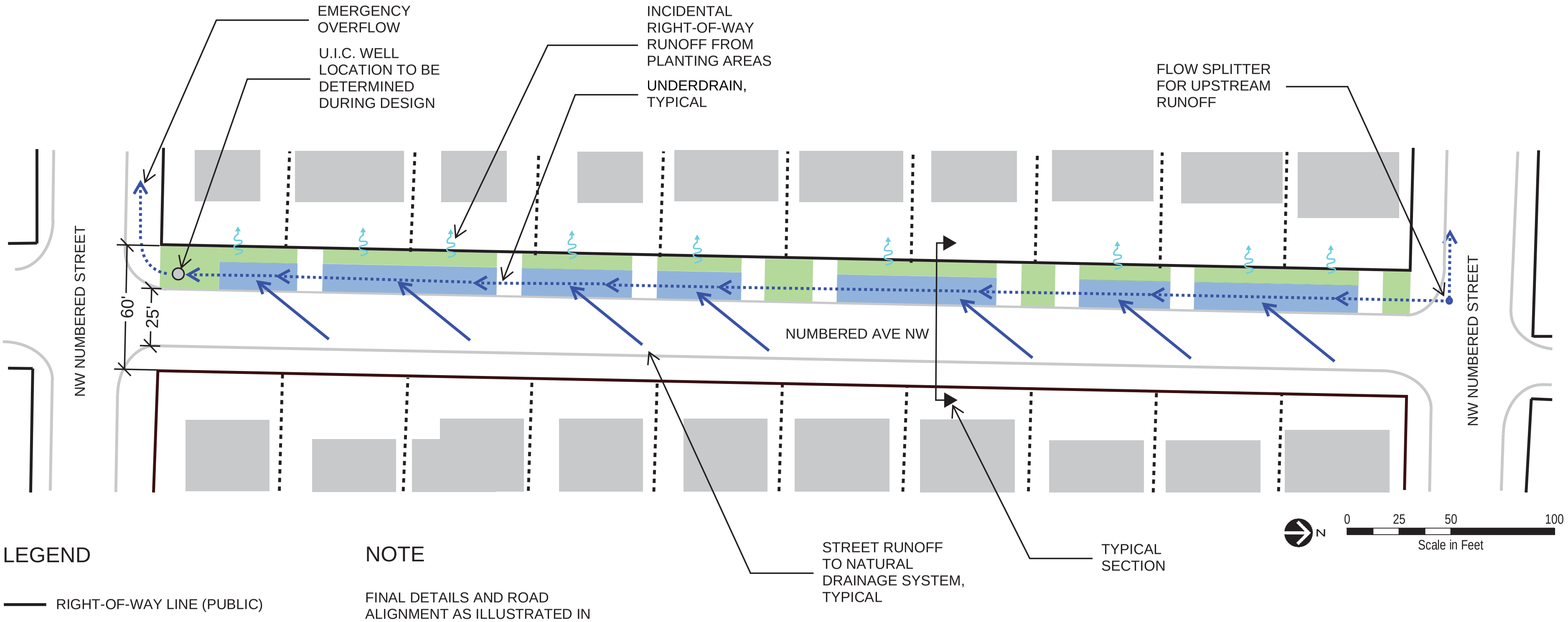
SDOT. 2018a. Sidewalk Development Program. Seattle Department of Transportation. Accessed March 8, 2019. <https://www.seattle.gov/transportation/projects-and-programs/programs/pedestrian-program/sidewalk-development-program>.

SDOT. 2018b. Seattle Streets Illustrated (Right-of-Way Improvements Manual), Section 3.1 – Sidewalks. Last Updated: June 9, 2017. Seattle Department of Transportation. Accessed March 8, 2019. <https://streetsillustrated.seattle.gov/design-standards/sidewalks/>.

SPU. 2017. SPU Cost Estimating Guide. Seattle Public Utilities. Accessed March 8, 2019. <https://www.seattle.gov/util/cs/groups/public/@spu/@engineering/documents/webcontent/02_015864.pdf>.

APPENDIX A

Walkway Concept Sections



LEGEND

- ▬ RIGHT-OF-WAY LINE (PUBLIC)
- ⋯ PROPERTY LINE (PRIVATE)
- 🟦 BIORETENTION AREA (SLOPED SIDES)
- 🟩 PLANTING AREA
- ← STORMWATER COLLECTION, AT GRADE
- ⇠ STORMWATER COLLECTION, PIPED
- ● U.I.C. WELL

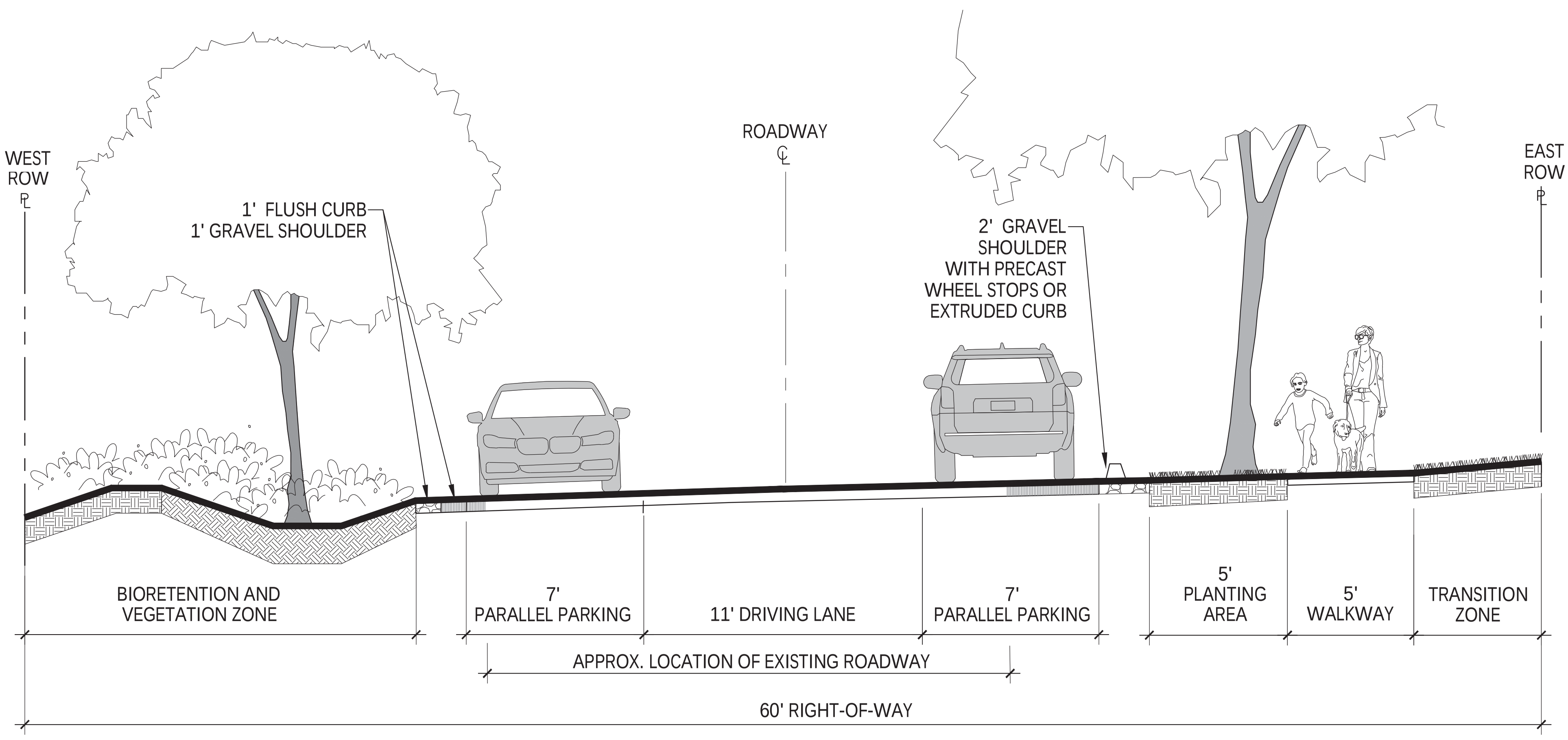
NOTE

FINAL DETAILS AND ROAD ALIGNMENT AS ILLUSTRATED IN THIS POTENTIAL PROPOSED CONCEPT TO BE ADJUSTED TO SITE SPECIFIC CONDITIONS.

SPU BROADVIEW - 12th AVENUE DRAINAGE IMPROVEMENTS: DRAFT CONCEPT 1A
CONCEPTUAL DRAINAGE PLAN

DATE: 4/30/2019

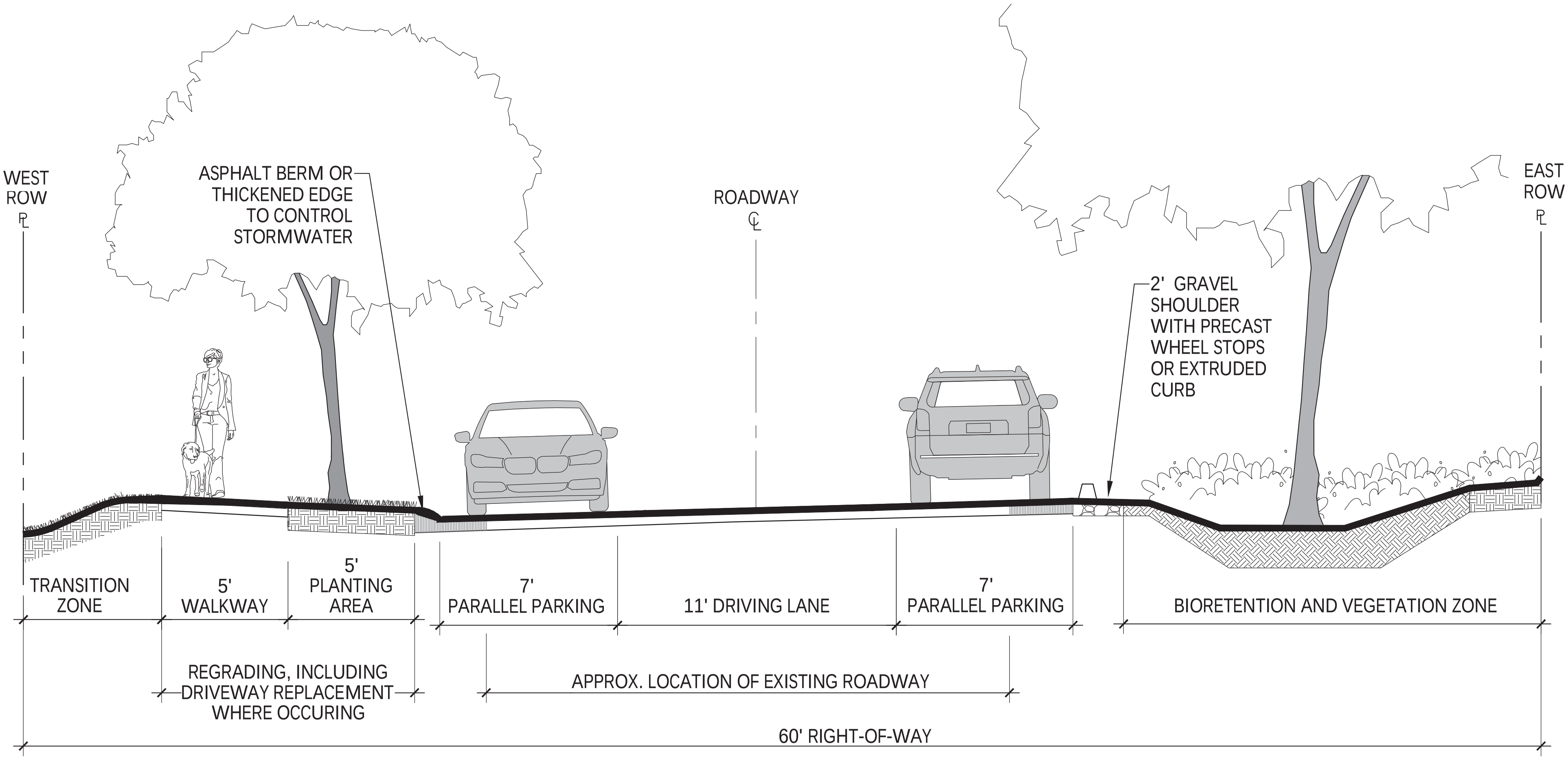
Brown AND Caldwell
HERRERA
CASCADE DESIGN COLLABORATIVE



SPU BROADVIEW - 12th AVENUE DRAINAGE IMPROVEMENTS: DRAFT CONCEPT 1A

SCALE: 1/4" = 1'-0"
DATE: 4/30/2019

Brown and Caldwell
HERRERA
CASCADE DESIGN COLLABORATIVE

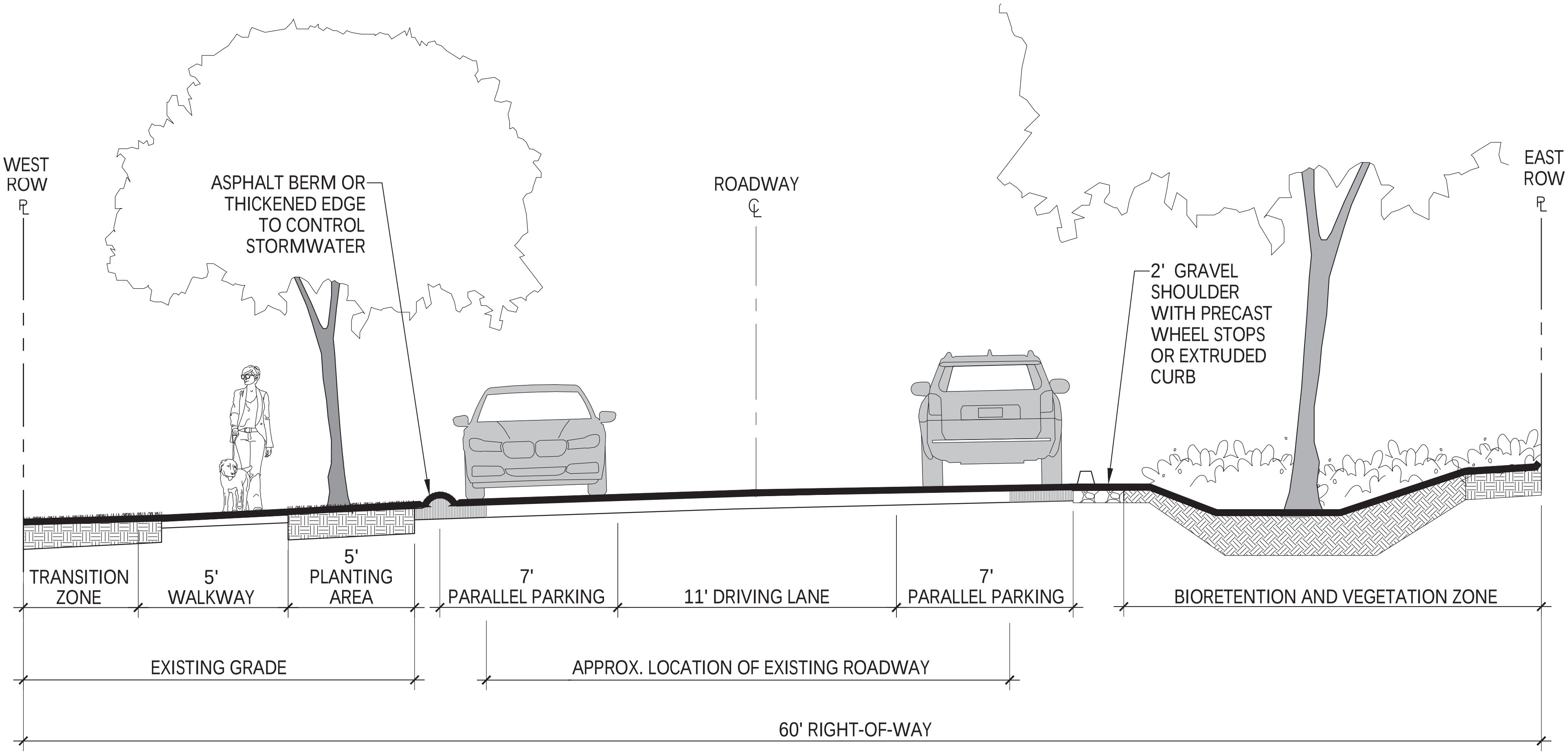


NOTE: BIORETENTION IS SHOWN ON THE UP-SLOPE SIDE OF THE STREET TO CAPTURE THE DESIGN AND COST IMPLICATIONS OF CONSTRUCTING A SIDEWALK ON THE LOW SIDE OF A THROWN STREET.

THIS CONFIGURATION WOULD LIKELY ONLY BE CONSIDERED WHERE A MAJOR UTILITY CONFLICT (E.G. WATER MAIN) OR OTHER MAJOR SITING CHALLENGES PROHIBIT SITING BIORETENTION ON THE DOWN-SLOPE SIDE OF THE STREET.

SPU BROADVIEW - 12th AVENUE DRAINAGE IMPROVEMENTS: DRAFT CONCEPT 1B

SCALE: 1/4" = 1'-0"
DATE: 4/30/2019



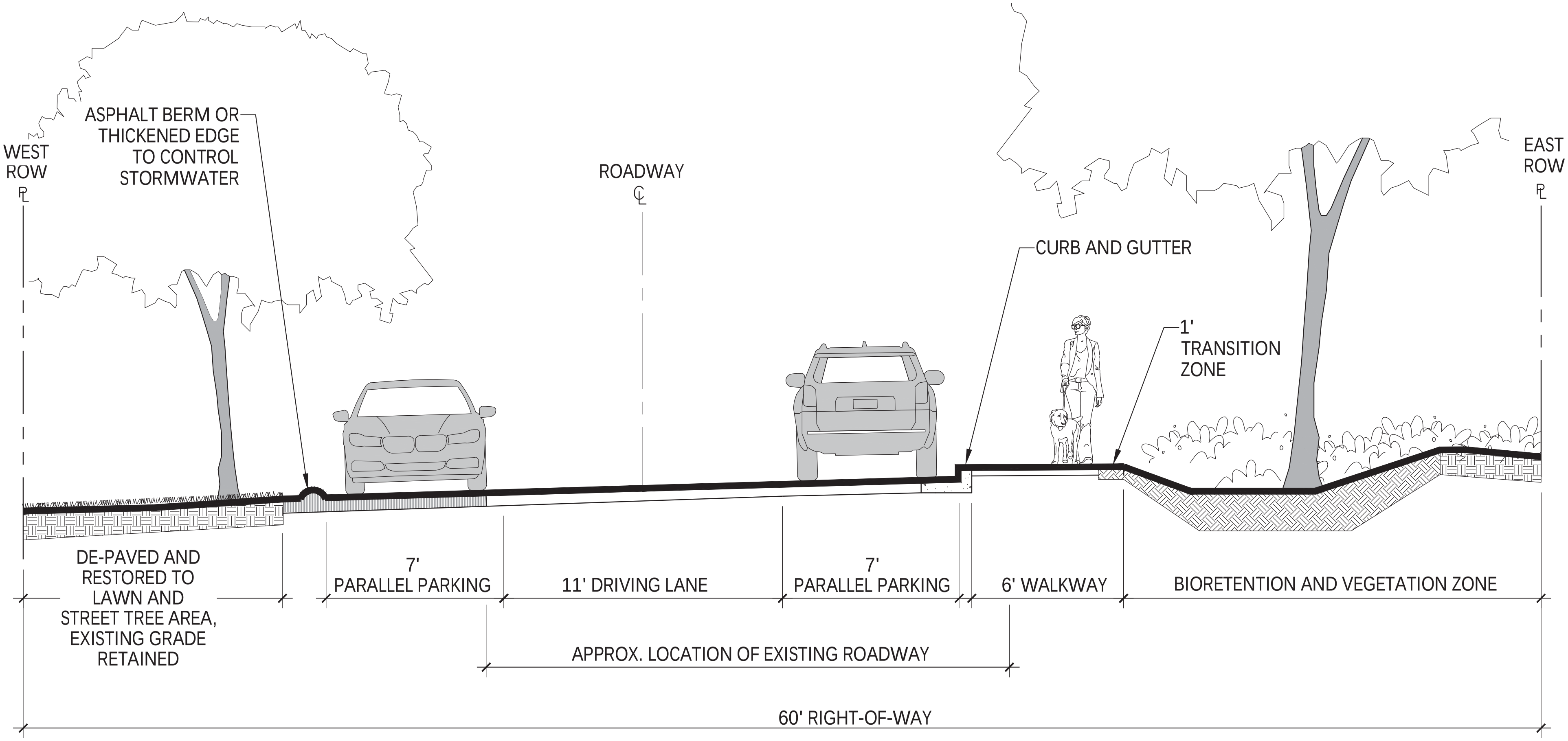
NOTE: BIORETENTION IS SHOWN ON THE UP-SLOPE SIDE OF THE STREET TO CAPTURE THE DESIGN AND COST IMPLICATIONS OF CONSTRUCTING A SIDEWALK ON THE LOW SIDE OF A THROWN STREET.

THIS CONFIGURATION WOULD LIKELY ONLY BE CONSIDERED WHERE A MAJOR UTILITY CONFLICT (E.G. WATER MAIN) OR OTHER MAJOR SITING CHALLENGES PROHIBIT SITING BIORETENTION ON THE DOWN-SLOPE SIDE OF THE STREET.

SPU BROADVIEW - 12th AVENUE DRAINAGE IMPROVEMENTS: DRAFT CONCEPT 1C

2ND AVE NW

SCALE: 1/4" = 1'-0"
DATE: 4/30/2019



NOTE: BIORETENTION IS SHOWN ON THE UP-SLOPE SIDE OF THE STREET TO CAPTURE THE DESIGN AND COST IMPLICATIONS OF CONSTRUCTING A SIDEWALK ON THE LOW SIDE OF A THROWN STREET.

THIS CONFIGURATION WOULD LIKELY ONLY BE CONSIDERED WHERE A MAJOR UTILITY CONFLICT (E.G. WATER MAIN) OR OTHER MAJOR SITING CHALLENGES PROHIBIT SITING BIORETENTION ON THE DOWN-SLOPE SIDE OF THE STREET.

SPU BROADVIEW - 12th AVENUE DRAINAGE IMPROVEMENTS: DRAFT CONCEPT 1D

SCALE: 1/4" = 1'-0"
DATE: 4/30/2019

APPENDIX B

Estimate of Additional Costs for Pedestrian Improvements

Construction Contract Amount Spreadsheet -
Estimate of Additional Cost for Pedestrian Improvements

Project Name:	12th Avenue NW Drainage Improvements
Project ID:	C312060
Project Phase:	Pre-30%
Cost Estimator(s):	Meghan Feller and Neil Schaner (Herrera)
Est. Reviewer(s)	Alice Lancaster (Herrera), Lisa Corry (CDC)
Date:	4/30/2019
Description:	Costs presented below reflect the rough order of magnitude additional costs for one long block (approximately 660-feet) of walkway (one side of the street) when constructed in conjunction with bioretention retrofits. The estimated quantities are based on preliminary analysis of feasibility and potential facility layout on 2nd Avenue Northwest from 127th Street to 130th Street (Concept 1; Block Selection Workshop, December 20, 2018). Costs are developed for five different surfacing alternatives. Refer to memorandum for description of each of the concepts presented below.

Item	Bid Item	Bid Item Description	Quantity				Unit	Unit Price	Unit Price Extension				Note Key
			1A	1B	1C	1D			1A	1B	1C	1D	
1	201005	CLEARING & GRUBBING {QTY<=5,000}	4,880	4,880	4,880	4,690	SF	$ 3.10	$ 15,128	$ 15,128	$ 15,128	$ 14,539	1
2	202750	SAWCUT Asphalt Concrete, Full Depth {QTY> 100LF}	-	-	-	-	LF	$ 6.50	$ -	$ -	$ -	$ -	2
3	204005	COMMON Excavation {QTY 200-500}	-	-	-	-	CY	$ 62.00	$ -	$ -	$ -	$ -	3
4	202030	REMOVE ASPHALT PAVEMENT {QTY >50 SY}	650	730	650	940	SY	$ 16.00	$ 10,400	$ 11,680	$ 10,400	$ 15,040	4
5	210015	UNCLASSIFIED BORROW {QTY >50 TN}	-	1,020	-	-	TN	$ 21.00	$ -	$ 21,420	$ -	$ -	5
6	401202	MINERAL AGGREGATE TYPE 2 {QTY< =200 TN}	-	-	-	150	TN	$ 70.00	$ -	$ -	$ -	$ 10,500	6
7	504045	PAVEMENT, HMA (CL 1/2 IN) {QTY>50 TN}	-	-	-	70	TN	$ 225.00	$ -	$ -	$ -	$ 15,750	7
8	819006	DRIVEWAY, CEM CONC, 6 IN {QTY >50 SY}	50	160	50	50	SY	$ 87.00	$ 4,350	$ 13,920	$ 4,350	$ 4,350	8
9	802070	TREE, Deciduous, 2 IN to 2- 1/2 IN CAL	20	20	20	20	EA	$ 385.00	$ 7,700	$ 7,700	$ 7,700	$ 7,700	
10	802610	SEEDED Lawn Installation {QTY <=10,000 SF}	5,460	5,460	5,460	5,360	SF	$ 1.60	$ 8,736	$ 8,736	$ 8,736	$ 8,576	9
11	804015	CURB and Gutter, Cem Conc {QTY<500}	480	-	-	470	LF	$ 55.00	$ 26,400	$ -	$ -	$ 25,850	10
12	806010	EXTRUDED Curb, Cem Conc {QTY >50 LF}	480	480	480	-	LF	$ 13.00	$ 6,240	$ 6,240	$ 6,240	$ -	

CEMENT CONCRETE SIDEWALK ALTERNATIVE - 5 FEET WIDE

13	814005	SIDEWALK, CEM CONC {QTY <500 SY}	340	340	340	340	SY	$ 105.00	$ 35,700	$ 35,700	$ 35,700	$ 35,700	11
		Construction Line Item Pricing (incl. 20% Contingency, Rounded)							**$ 137,600**	**$ 144,700**	**$ 106,000**	**$ 165,700**	

PERVIOUS CONCRETE SIDEWALK ALTERNATIVE - 5 FEET WIDE

13	506005	PERVIOUS Concrete Sidewalk {QTY >250 SY}	340	340	340	340	SY	$ 155.00	$ 52,700	$ 52,700	$ 52,700	$ 52,700	12
14		MINERAL AGGREGATE TYPE 24 {QTY <200 TN}	110	110	110	110	TN	$ 50.00	$ 5,500	$ 5,500	$ 5,500	$ 5,500	12
15	215020	CONSTRUCTION GEOTEXTILE FOR SEPARATION {	460	460	460	460	SY	$ 3.25	$ 1,495	$ 1,495	$ 1,495	$ 1,495	12
		Construction Line Item Pricing (incl. 20% Contingency)							**$ 166,400**	**$ 173,500**	**$ 134,700**	**$ 194,400**	

CRUSHED GRAVEL SIDEWALK ALTERNATIVE - 5 FEET WIDE

13	-	1/4 MINUS, CRUSHED GRAVEL, 4" Thick	210	210	210	210	TN	$ 50.00	$ 10,500	$ 10,500	$ 10,500	$ 10,500	13
		Construction Line Item Pricing (incl. 20% Contingency)							**$ 107,400**	**$ 114,400**	**$ 75,700**	**$ 135,400**	

FLEXIBLE POROUS SIDEWALK ALTERNATIVE - 5 FEET WIDE

13	802380	FLEXIBLE POROUS SURFACE TREATMENT - 1.5" T	20	20	20	20	CY	$ 4,558.00	$ 91,160	$ 91,160	$ 91,160	$ 91,160	14
14	401202	MINERAL AGGREGATE TYPE 2 {QTY< =200 TN}	110	110	110	110	TN	$ 70.00	$ 7,700	$ 7,700	$ 7,700	$ 7,700	14
		Construction Line Item Pricing (incl. 20% Contingency)							**$ 213,400**	**$ 220,500**	**$ 181,700**	**$ 241,400**	

HMA SIDEWALK ALTERNATIVE - 5 FEET WIDE

13	504045	PAVEMENT, HMA (CL 1/2 IN) {QTY>50 TN}	60	60	60	60	TN	$ 225.00	$ 13,500	$ 13,500	$ 13,500	$ 13,500	15
14	401202	MINERAL AGGREGATE TYPE 2 {QTY< =200 TN}	70	70	70	70	TN	$ 70.00	$ 4,900	$ 4,900	$ 4,900	$ 4,900	15
		Construction Line Item Pricing (incl. 20% Contingency)							**$ 116,900**	**$ 123,900**	**$ 85,200**	**$ 144,900**	

NOTES

1 Includes tree protection, removal of fences and other obstructions for west side of street, less existing paved area (i.e., driveways and informal parking areas)

2 Assume saw cutting required on both sides of the street as part of drainage improvements (no additional cost incurred for sidewalk/walkway construction)

3 Assume no additional excavation required for sidewalk construction (road excavation as part of drainage improvement - assume sidewalk placed on prepared subgrade)

4 Driveways (or portions of driveways) and informal parking areas, up to 6IN thick. Roadway pavement removal and partial driveway removal (5' from new roadway edge) included in Concept 1D. Roadway pavement removal in Concept 1D includes pavement removed beyond what is required for road widening for drainage (since road centerline is shifted to accommodate sidewalk on east side of street). Full driveway removal included in Concept 1B.

5 Includes 18 inch average grading depth on west side of street - Concept 1B only.

6 (6) inch thick per Std Plan 401 (Residential Pavement Sections). Only included in Concept 1D. Includes new pavement beyond what is required for road widening for drainage (since road centerline is shifted to accommodate sidewalk on east side of street)

7 (3) inches per Std Plan 401 (Residential Pavement Sections). Only included in Concept 1D. Includes new pavement beyond what is required for road widening for drainage (since road centerline is shifted to accommodate sidewalk on east side of street)

8 New driveway aprons. Assume 8 driveways. 10' wide with (2) 2.5' wings at curb line. Driveway replacement for Concept 1B and 1D only (where shifting road centerline or re-grading

9 Includes establishment.

10 Concept 1A includes flush curb on west side of street. Concept 1D includes curb and gutter on east side of street to provide barrier for sidewalk.

11 Concrete sidewalk (3-1/2" thick) per Seattle Standard Plan 420.

12 Pervious concrete sidewalk (5" thick) over 6" thick gravel base per Seattle Standard Plan 425. Construction geotextile per Standard Plan.

13 Non-standard sidewalk material. Assume 4" thick crushed rock @ $50/ton (estimated based on comparable Seattle standard mineral aggregate pricing).

14 Non-standard sidewalk material. Assume 1.5" thick flexible porous surface treatment over 6" thick gravel base.

15 HMA sidewalk (3" thick) over 4" thick gravel base per Seattle Standard Plan 425.

Date: 4/30/2019

APPENDIX C

Draft Preliminary Options Analysis Cost Estimate

(Base Bioretention Costs without Pedestrian Improvements)

Draft Preliminary Options Analysis Cost Estimate

Project Name: SPU Broadview 12th Avenue Drainage
SPU Project No.: C312060
Prepared by: Neil Schaner and Katie Wingrove, Herrera
Checked by: Meghan Feller, Herrera
Project Manager: Alice Lancaster, Herrera

Date Prepared: 4/30/2019

Project Description

This project, located in Seattle's Broadview neighborhood (West Mohlendorph Creek basin), proposes to retrofit the public right-of-way with roadside bioretention cells and UIC wells to reduce flooding in downstream areas and provide water quality treatment for street runoff. These improvements will be constructed in conjunction with conveyance improvements and detention pipes in the basin. Based on current system modeling, the team anticipates that up to 5 short blocks (~330-foot-long blocks) will be retrofit with roadside bioretention facilities. These facilities will include underdrains and UIC wells to facilitate infiltration of treated water into a deeper, permeable aquifer. The current character of the right-of-way is unimproved, with substandard streets (~20-22-foot wide), informal (curbless/ditch/culvert) drainage, no sidewalks, and intermittent and informal paving and parking to the right-of-way line. The streets currently being considered for bioretention facility retrofits are classified as Neighborhood Yield (curbless deviation) and Neighborhood Corridor (currently substandard and curbless).

Estimate Description

This estimate reflects the probable cost of construction bid for retrofitting **one representative "long" block** (approximately 660 feet) in the Broadview neighborhood with roadside bioretention as described below. The estimated quanitites are based on preliminary analysis of feasibility and potential facility layout on the eastern side of 2nd Avenue Northwest from 127th Street to 130th Street (Concept 1; Block Selection Workshop, December 20, 2018). For the purposes of project performance assessment and cost estimating, this block is assumed to be approximately representative of other blocks within the drainage basin deemed feasible for retrofit. Because the scope of this project is still being refined (in number and location of GSI project blocks, and in items included (e.g., sidewalk/walkway)), this estimate presents the costs by anticipated major work items to more clearly capture the cost of this work and facilitate project decision-making. This estimate serves as an interim estimate of costs (scaleable by number of blocks to be retrofit), and will be refined once the final blocks are selected and concept design is complete. The estimate is compared to costs generated with the GSI Program Cost Tool that was developed for Options Analysis phase costing.

🟨 Cells highlighted in yellow represent line items identified by the project team that may warrant further consideration for inclusion (or exclusion) in the final Options Analysis cost estimate.

ITEMIZED COST (AND COMPARISON TO GSI PROGRAM COST TOOL)

				Concept 1A Downslope Deep Well			
	Unit	Unit Cost (2018 Dollars)	Minimum Bid (2018 Dollars)	Quantity	Cost (2018 dollars)	GSI Program Cost Tool Comparison Notes	Approx. Cost Increase Relative to Program Tool
BIORETENTION COSTS							
Base Cell Costs							
Clearing and Grubbing	SF	$ 3	$ 1,000	7,110	$ 22,041		$ 600
Channel Excavation	CY	$ 52	$ 5,000	504	$ 26,208	Increased unit price from $41/CY. Qty adjusted down based on Standard Plan 293 and anticipated facility dimensions.	$ (16,100)
Mineral Aggregate, Type 6	TON	$ 50	$ 500	96	$ 4,800	Included as Type 26 in the Program tool. Type 6 has same unit price as Type 26, so no net change in total cost for rock. Will evaluate materials at 30% design.	$ 4,800
Mineral Aggregate, Type 26	TON	$ 50	$ 500	105	$ 5,250	Qty adjusted down based on Standard Plan 293.	$ (17,500)
Underdrain MH w/sump type 204 (assume 1 per 200ft)	EA	$ 5,625	$ -	3	$ 16,875	Qty adjusted down based on concept layout.	$ (5,600)
Underdrain 8" Dia. Slotted PVC Pipe	LF	$ 39	$ 1,000	600	$ 23,400	Qty adjusted down (GSI Program assumptions too conservative for this configuration).	$ (6,000)
Utility Trench Dam (assume 1 per 200ft)	EA	$ 1,500	$ -	3	$ 4,500	Qty adjusted down.	$ (1,500)
Bioretention Soil Mix (18" depth)	CY	$ 82	$ 1,000	263	$ 21,566	Qty adjusted down based on Standard Plan 293 and anticipated facility dimensions.	$ (3,000)
Mulch, Decomposed Organic, Compost	CY	$ 77	$ 500	27	$ 2,079		$ 300
Mulch, Bark (3" depth)	CY	$ 51	$ 500	23	$ 1,173		$ (600)
Bioretention Planting	SF	$ 11	$ 1,000	4,353	$ 47,883	Qty adjusted down, removing restoration area and tabulating instead as landscape restoration.	$ (32,100)
Construction Plant Establishment	SF	$ 1	$ 1,000	7,110	$ 7,110		$ (200)

ITEMIZED COST (AND COMPARISON TO GSI PROGRAM COST TOOL)

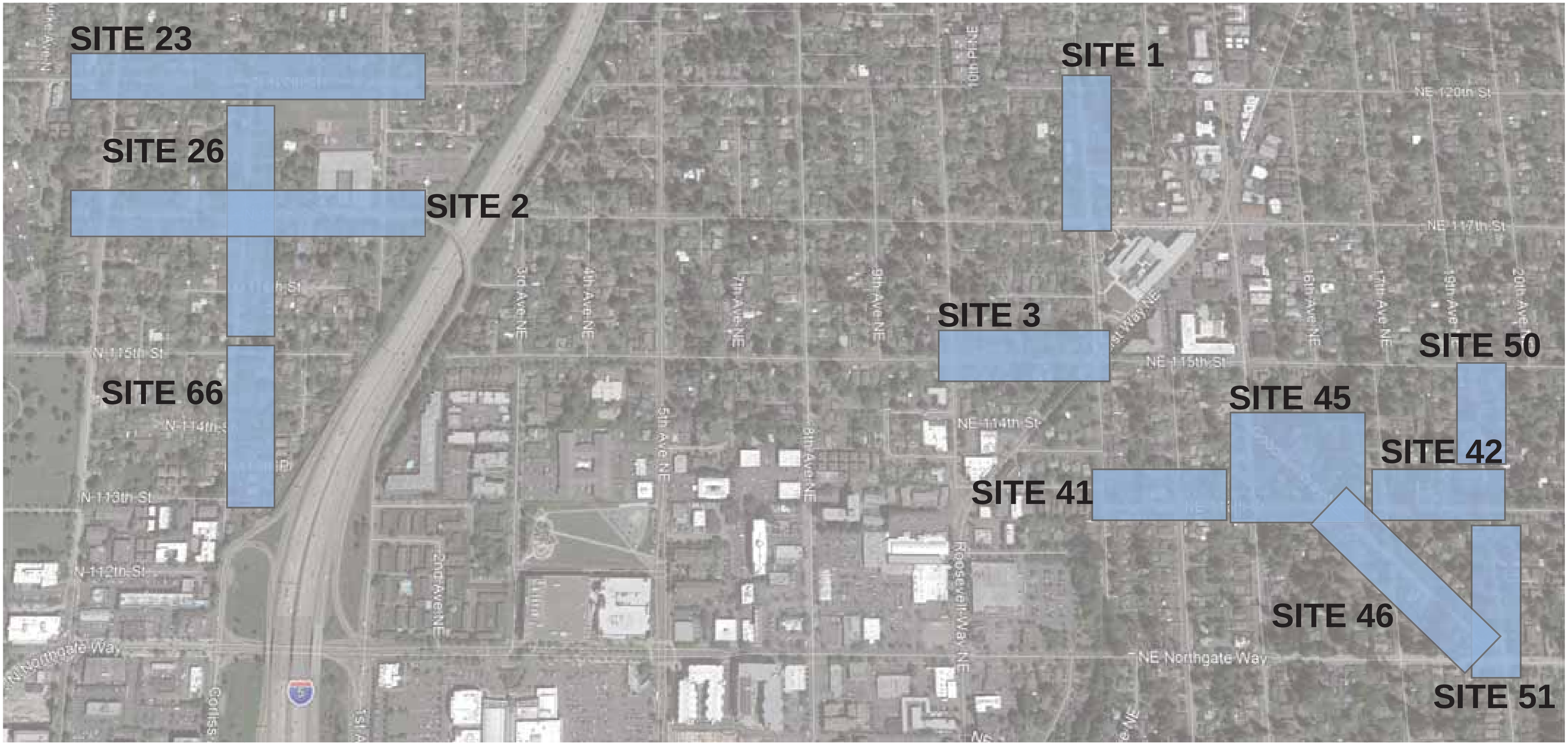
				Concept 1A Downslope Deep Well			
	Unit	Unit Cost (2018 Dollars)	Minimum Bid (2018 Dollars)	Quantity	Cost (2018 dollars)	GSI Program Cost Tool Comparison Notes	Approx. Cost Increase Relative to Program Tool
Hand Watering - 1st Year	SF	$ 2	$ -	4,353	$ 8,706	Qty adjusted down, removing restoration area (assumes minimal hand watering for sod areas)	$ (6,600)
Landscape Restoration (Sodding)	SF	$ 3	$ 500	2,757	$ 8,271	NEW ITEM. Previously included in bioretention planting qty.	$ 8,300
Tree Root Barrier	LF	$ 12	$ 1,000	0	$ -	Qty adjusted down. Assume no sidewalk on facility side.	$ (4,100)
Drain Curb Cut Type 1 (COS Std. Plan 295b)	EA	$ 1,136	$ -	16	$ 18,176	Qty adjusted down based on concept layout and anticipated number of cells. Carrying cost at Options Analysis to cover inlet related work (cobbles, flush ribbon curb, etc.)	$ (6,800)
PIPE, PSD, D.I., CL 52, 12 IN (or CL 50)	LF	$ 155	$ 1,000	300	$ 46,500	Conveyance pipe between cells.	$ -
Weirs	EA	$ 571	$ -	0	$ -	NEW ITEM. NOT INCLUDED. Consider in 30% design.	$ -
Additional Lined Cell Costs							
Geotextile Fabric (assume 100% lined)	SY	$ 3	$ 1,000	855	$ 2,779	NEW ITEM. Fabric placed to protect geomembrane.	$ 2,800
Geomembrane Liner for Cells (assume 100% lined)	SY	$ 6	$ 1,000	855	$ 5,131	Increased unit price from $3.30. Qty adjusted up to reflect anticipated facility area/geometry.	$ 3,200
Additional "per Block" Costs							
Street Sheet flow Test through Inlet/Curb Cuts	LS	$ 1,550	$ 1,550	0	$ -	ITEM REMOVED. Assume project will not include curb cuts that require flow testing.	$ (1,600)
Civil Structures O&M - 1st Year	LS	$ 2,066	$ 2,066	1	$ 2,066		$ -
STREET RESTORATION & IMPROVEMENT COSTS							
Driveway Restoration	SY	$ 87	$ 1,000	129	$ 11,223	Qty adjusted up based on concept layout and anticipated impacted driveways.	$ 5,700
Sidewalk Restoration	SY	$ 105	$ 1,000	0	$ -	Qty adjusted down. No existing sidewalk on project.	$ (2,300)
Shift Roadway Alignment or Alter Roadway Width							
Remove Asphalt Pavement	SY	$ 20	$ -	133	$ 2,660	NEW ITEM. Included as discretionary item in Program Cost tool. Includes minor removal of existing roadway pavement to accommodate road widening.	$ -
Sawcut Asphalt Concrete, Full Depth	LF	$ 10	$ -	1,200	$ 12,000	NEW ITEM. Included as discretionary item in Program Cost tool. Includes minor work on existing roadway pavement to accommodate road widening.	$ -
Pavement Patch, Temporary	TON	$ 320	$ -	0	$ -	NEW ITEM. NOT INCLUDED. Consider in 30% design.	$ -
Mineral Aggregate, Type 2	TON	$ 70	$ 500	103	$ 7,210	NEW ITEM. Broken out as separate item in this estimate.	$ 7,200
Pavement, HMA (Cl 1/2 IN)	TON	$ 295	$ -	60	$ 17,700	NEW ITEM. GSI cost tool indirectly and partially includes HMA in thickened edge qty. Broken out in this estimate to account for variable road widening needs.	$ 17,700
Thickened Edge, HMA	LF	$ 15	$ 1,000	600	$ 9,000	Decreased unit price because we are separately accounting for roadway widening depending on site conditions (cost tool assumes 4' widened/replaced). See Pavement, HMA line item.	$ (7,800)
New Sidewalk, Depaving, Landscape Restoration							
Unclassified Borrow	TON	$ 21	$ 500	0	$ -	NEW ITEM. NOT INCLUDED. Consider including cost of fill on downslope side of street.	$ -
Sidewalk, Cem Conc (new)	SY	$ 105	$ 1,000	0	$ -	NEW ITEM. Included as discretionary item in Program Cost tool. Not included in estimate. See Appendix B.	$ -
Remove Asphalt Pavement (depaving)	SY	$ 20	$ -	325	$ 6,500	NEW ITEM. Included as discretionary item in Program Cost tool.	$ -
Landscape Restoration (Sodding)	SF	$ 3	$ 500	1,990	$ 5,970	NEW ITEM. Included as discretionary item in Program Cost tool. Includes restoration of landscape after depaving on facility side of street.	$ -

ITEMIZED COST (AND COMPARISON TO GSI PROGRAM COST TOOL)				Concept 1A Downslope Deep Well			
	Unit	Unit Cost (2018 Dollars)	Minimum Bid (2018 Dollars)	Quantity	Cost (2018 dollars)	GSI Program Cost Tool Comparison Notes	Approx. Cost Increase Relative to Program Tool
INTERSECTION IMPACT COSTS							
Intersections Impacts							
Mineral Aggregate, Type 2	TON	$ 70	$ 500	18	$ 1,260	Qty adjusted up. Qty not included in Program Cost Tool.	$ 1,300
Catch Basin Type 242	LS	$ 3,700	$ -	0	$ -	Increased unit price from $2,775. Qty adjusted down. Assuming no CBs at intersections would need to be reset.	$ (6,700)
Pavement, HMA (Cl 1/2 IN)	TON	$ 295	$ -	11	$ 3,245		$ 300
ADA Ramp	EA	$ 3,400	$ -	8	$ 27,200	Consider reducing unit cost to reflect curbless ramps (e.g., tactile warning strip only). Current cost likely conservative.	$ -
Curb and Gutter, Cem Conc	LF	$ 55	$ -	0	$ -	Qty adjusted down. Assuming no curb and gutter required at intersections.	$ (4,400)
PIPE, PSD, D.I., CL 52, 8 IN (or CL 50)	LF	$ 125	$ -	0	$ -	Qty adjusted down. Assuming no CBs or pipes at intersections would need to be reset.	$ (4,200)
ADDITIONAL COSTS							
UIC Well	EA	$ 50,000	$ -	2	$ 100,000	Increased unit price from $46,500.	$ 7,000
Catch Basin Type 240A (for flow splitter)	LS	$ 6,000	$ -	1	$ 6,000	NEW ITEM. Included as discretionary item in Program Cost tool.	$ -
PIPE, PSD, D.I., CL 52, 12 IN (or CL 50) (for flow splitter)	LF	$ 155	$ 1,000	100	$ 15,500		$ -
Side Sewer Relocation EA	EA	$ 2,000	$ -	3	$ 6,000	NEW ITEM. Included as discretionary item in Program Cost tool.	$ -
Water Service Relocation EA	EA	$ 1,500	$ -	5	$ 7,500	NEW ITEM. Included as discretionary item in Program Cost tool.	$ -
Gas Service Relocation EA	EA	$ 2,000	$ -	0	$ -	NEW ITEM. NOT INCLUDED. Include in 30% design.	$ -
2" Gas Main Relocation EA	LF	$ 25	$ -	0	$ -	NEW ITEM. Assume cells located on opposite side of street.	$ -
Cast Iron Water Main Vibration Monito EA	EA	$ 25,000	$ -	0	$ -	NEW ITEM. NOT INCLUDED. Assume adequate clearance.	$ -
Tree Removal EA	EA	$ 500	$ -	0	$ -	NEW ITEM. NOT INCLUDED. Assume no existing trees removed.	$ -
Tree Planting EA	EA	$ 385	$ -	20	$ 7,700		$ -
Project Traffic Control	MO	$ 10,000	$ 10,000	2	$ 20,000		$ 200
Tree and Vegetation Protection	LS	$ 1,550	$ 1,550	1	$ 1,550		$ -
Temporary Erosion and Sediment Control	LS	1.0%	$ 7,500		$ 7,500		$ (200)
Removals	LS	3.5%			$ 19,300	Percentage based.	$ (3,500)
Mobilization	LS	10%			$ 57,000	Percentage based.	$ (20,300)
SUBTOTAL (Construction Line Item Pricing)					$ 626,532		$ (91,700)
Allowance for Indeterminates	LS	25%	$ -		$ 156,633		
SUBTOTAL					$ 783,165		
Escalation to Mid-Point of Construction	LS	0%	$ -		$ -		
SUBTOTAL (Escalated to Mid-Point of Construction)					$ 783,165		
Contingency	LS	20%			$ 156,633		
SUBTOTAL (incl. Construction Allowances)					$ 939,798		
Sales Tax	LS	10.10%			$ 94,920		
EST. PROBABLE COST OF CONSTRUCTION BID (One 660-ft Block)					**$ 1,034,718**		
Assumed Number of Blocks to be Retrofit		2.0					
ESTIMATED PROBABLE COST OF CONSTRUCTION BID (TOTAL)					**$ 2,069,435**	**(2018 Dollars)**	

Appendix B: Sample Outreach Materials

- Sample Outreach for Project Overview and Study Area available by request from WTD
- Sample Outreach Map of Potential Sites
- Sample Notification for Field Work (non-ground disturbance)
- Sample Outreach of Potential Concept Outside Roadway with Community Survey Questions
- Sample of preferred SPU graphic of outreach plans of potential streets with roadside bioretention for use at community block meetings
- Sample Outreach Survey from SPU NDS projects at start of Options Analysis Phase
- Sample Outreach Map of Sites Selected for Design

THORNTON NATURAL DRAINAGE SYSTEMS



SPU IS STUDYING THE FEASIBILITY OF NATURAL DRAINAGE SYSTEMS IN THIS NEIGHBORHOOD FOR TWO REASONS: 1) TO ADDRESS LOCALIZED FLOODING PROBLEMS SUCH AS PUDDLES IN STREETS OR DRIVEWAYS AND 2) TO REMOVE POLLUTANTS FROM STORMWATER BEFORE IT REACHES THE CREEK. THESE MAPS INCLUDE ONLY POTENTIAL NDS SITES IN THE SECOND CATEGORY. POTENTIAL NDS SITES ADDRESSING LOCALIZED FLOODING PROBLEMS WERE PRESENTED IN AN EARLIER PUBLIC OUTREACH AND ARE NOT INCLUDED HERE.

FEASIBILITY STUDY

OVERALL PROJECT AREA

King County
Department of Natural Resources and Parks
Wastewater Treatment Division

BARTON CSO CONTROL PROJECT

UPCOMING FIELD WORK: King County crews working to locate and map underground utilities and evaluate trees in late July-August

What's happening in the street?

King County will be back in your neighborhood in late July and August to gather additional field data as we continue design of the bioretention swales for the Barton CSO Control project. Your street is one of the streets in the project area selected for additional field work.

Why more field work?

Locating and mapping underground utilities is necessary for planning and design of the bioretention swales and is a Seattle Department of Transportation permitting requirement.

Private property tree evaluation is being done to avoid damaging roots during construction. Trees will be evaluated on private property where right-of-entry has been provided. For properties without right-of-entry, field staff will evaluate trees from the public right-of-way, to the extent possible.

Stay Safe!

Please avoid the work zone area. Crews will be focused on their work and equipment, and will be wearing earplugs. If you need to speak to someone, please make sure the crews see you.

QUESTIONS?

Contact Kristine Cramer:

206-263-3184 or
Kristine.cramer@kingcounty.gov

Search "Barton CSO Control" at king county.gov

What can you expect?

- Work beginning in late July and lasting about four weeks.
- Work occurring weekdays between 7:00 a.m. and 6:00 p.m.
- Field staff taking measurements and photographs for survey work, and writing notes on conditions in the public right-of-way and the state of existing trees.
- Small holes drilled in the public right-of-way to locate underground utilities (water, telecommunications). Holes will be patched in paved areas or replanted in grassy areas.
- Short-term parking limitations near survey work.
- Spray paint marking on the street at test locations.
- A truck in the street using video equipment to determine the depth and location of your neighborhood's combined sewer system and side sewer locations under the planter strips in the public right-of-way.
- Spray paint markings so a surveyor can map the locations.

THANK YOU FOR YOUR PATIENCE AND COOPERATION!

ALTERNATIVE FORMATS AVAILABLE

206-684-1280 or 711 (TTY Relay

Seattle
Public
Utilities

KING COUNTY
FLOOD CONTROL
DISTRICT

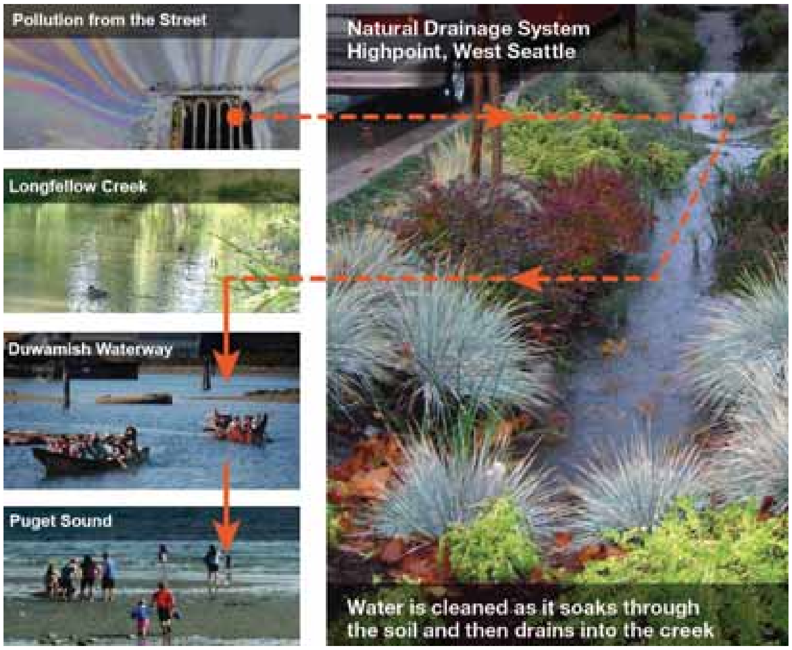
Improving Our Communities with Natural Drainage Systems

What are they and why do we need them?

When it rains in Delridge, pollution from our streets runs into Longfellow Creek untreated. This is not healthy for the creek or for people. **The good news is: there is something we can do.**

Natural Drainage Systems consist of shallow depressions in the public right-of-way, or "planter strip," filled with deep-rooted plants and spongy soils that temporarily hold and clean polluted stormwater from streets and sidewalks. These features capture and clean pollutants before they can reach the creek.

Seattle Public Utilities (SPU) is planning to build natural drainage systems in your neighborhood in 2019/2020.



What is the NDS Partnering Program?

The **2016-2025 Natural Drainage Systems Partnering Program** is a Seattle Public Utilities multi-year capital improvement program focused on Longfellow, Piper's, and Thornton Creek watersheds.

The program's goal is to construct street-side natural drainage systems that filter and manage stormwater and improve neighborhoods with street trees, traffic calming, and, in some cases, a limited number of sidewalks.

Community Benefits

Natural Drainage Systems offer multiple benefits to local neighborhoods and ecosystems, including:

- **Greener, more attractive neighborhoods**
- **Lower risk of flooding**
- **Additional natural habitat for native plants and animal species**
- **Healthier creek ecosystems**
- **Calmer traffic patterns**
- **More street trees**

Longfellow Creek Natural Drainage Systems (NDS) Project

10/25/18 Drop-in Session

Seattle Public Utilities

KING COUNTY FLOOD CONTROL DISTRICT

The Site Selection Process: How we got here

Choosing sites was an iterative process.

Citywide Integrated Plan

Watersheds prioritized to improve water quality in local creeks and Puget Sound by cleaning the stormwater flowing into them.

Local Community Action

Technical Assessment

Identified blocks that could include natural drainage systems.

Partnering

Determined opportunities to provide extra community benefits by partnering with other City departments or community groups.

Equity Lens

Prioritized outreach efforts in the southern portion of the Longfellow Creek watershed.

Resident Survey

Asked a large pool of residents about interest in these projects.

Final Site Selection

Selected project sites based on ability to clean water, additional benefits and partnerships, and support from the community.

Seattle Public Utilities

KING COUNTY FLOOD CONTROL DISTRICT

An Opportunity for Improvement

SW Kenyon Street and 24th Ave SW

SW Kenyon Street and 24th Ave SW

Longfellow Creek Natural Drainage Systems (NDS) Project

10/25/18 Drop-in Session

Seattle Public Utilities

KING COUNTY FLOOD CONTROL DISTRICT

How do you currently use the project site at 24th and Kenyon?

Place dot(s) in all applicable circles.

I jog or walk on the trails

I bike on the trails

I use it to get to a bus stop

I use it to get to work or school

I bike in the neighborhood

I walk / run in the neighborhood

I sit or hang out in the area

I play or spend time with friends

I walk my dog

I park my car nearby

I do not use the space

Other (please describe)

Longfellow Creek Natural Drainage Systems (NDS) Project

10/25/18 Drop-in Session

Seattle
Public
Utilities

KING COUNTY
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DISTRICT

How would you choose to change the project site at 24th and Kenyon?

Place dot(s) in all applicable circles.

Add more lighting

Fix the path so it's not so muddy

Remove the parking at street end

Add educational signs that explain the importance of a healthy Longfellow Creek

Plant new trees along the path

Replace the bridge

Make the path and bridge better for bikes, strollers, wheelchairs, etc.

Add places to sit

Improve visibility along the path

Clean up litter and garbage

Slow down traffic along 24th Ave and SW Kenyon

Other (please describe)

Longfellow Creek Natural Drainage Systems (NDS) Project

10/25/18 Drop-in Session

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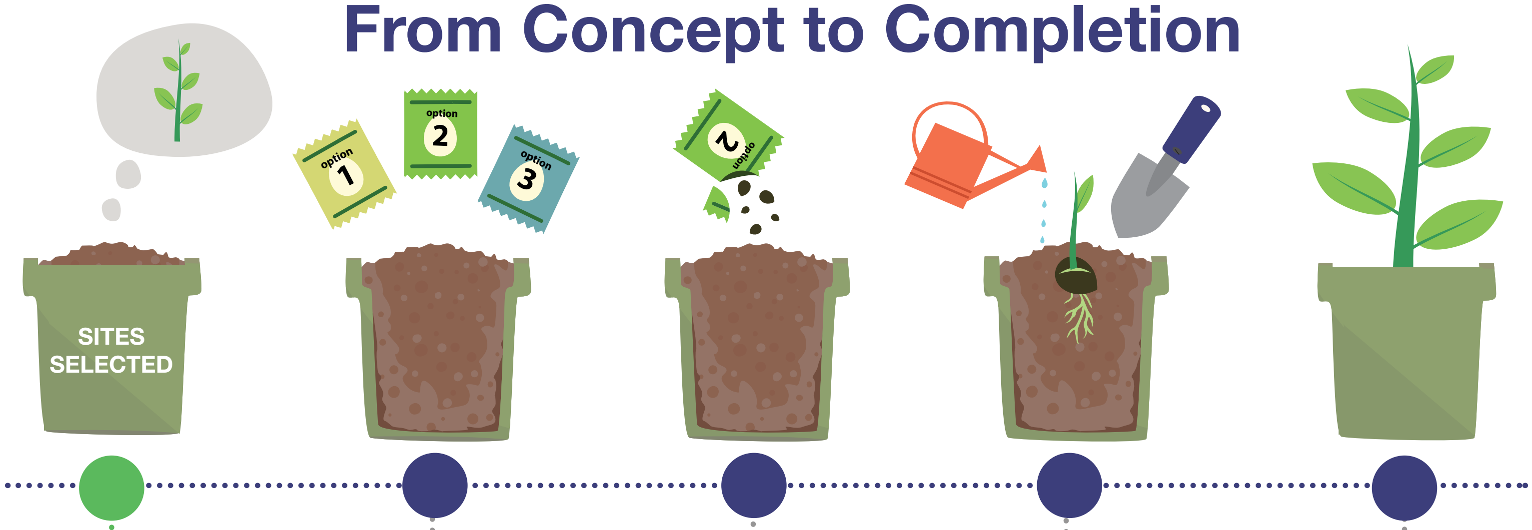
A Site's Lifecycle: What to Expect

From Concept to Completion



CONCEPT
(we are here)

Fall 2018

You'll notice:
No physical changes. During this stage, the City will be initiating communications and hosting events to understand the needs and challenges that the project should address. Sites selected for design.

EARLY DESIGN

Early 2019

You'll notice:
No physical changes. The City will be taking measurements and talking to the community to understand the site characteristics that will guide site planning. Basic design and art concept will be developed.

LATER DESIGN

Later 2019

You'll notice:
No physical changes. Technical details will be finalized and plants selected for design.

CONSTRUCT

2020

You'll notice:
Construction and related preparations. During this stage, you may see dust, dirt, earth-moving machinery, and communications related to road closures, traffic detours, and other local impacts.

DONE!

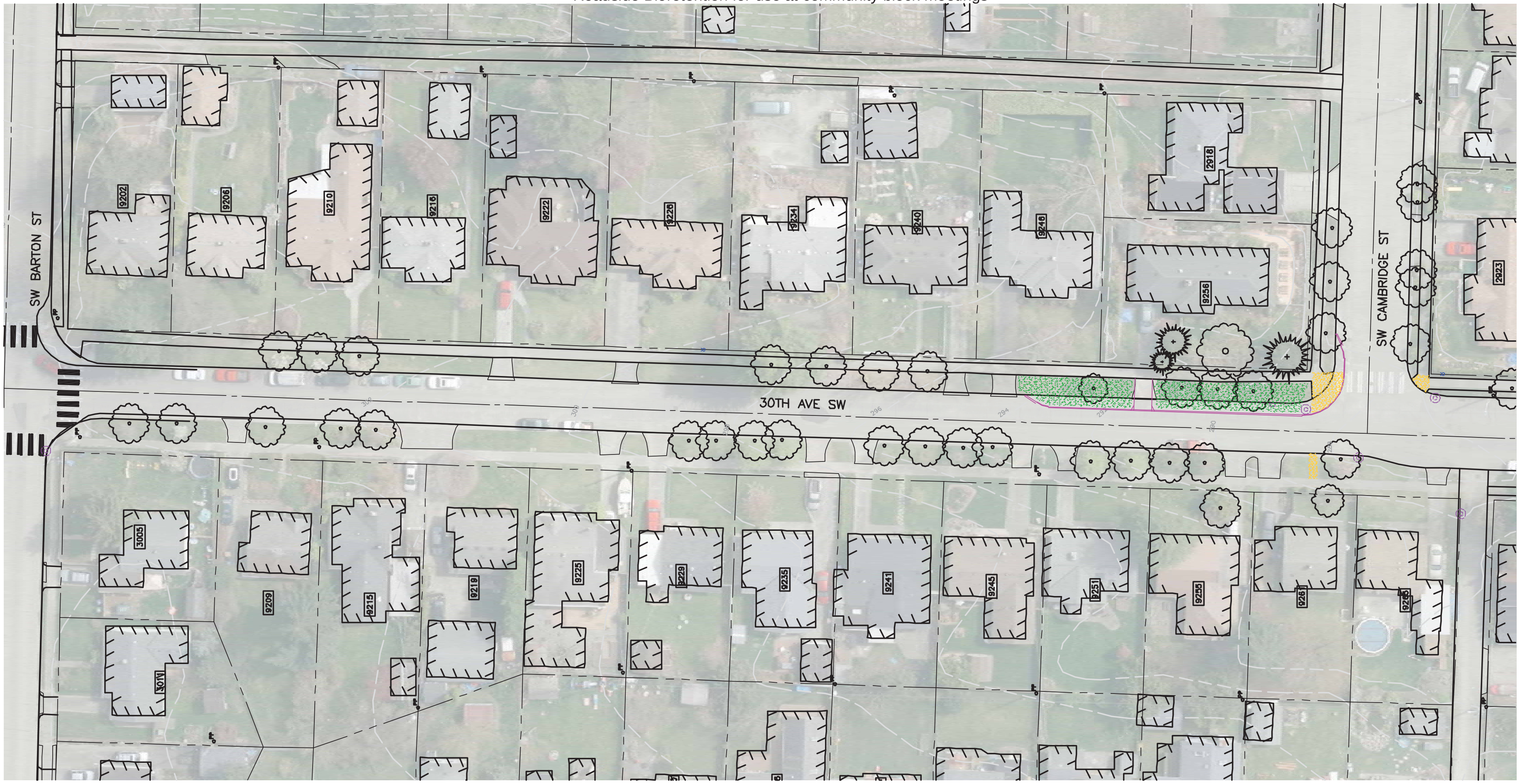
2020

You'll notice:
A brand new site! The "built" site may not be what you imagined. Living features will need time to grow, and constructed features may require additional work to be usable.

Longfellow Creek Natural Drainage Systems (NDS) Project

10/25/18 Drop-in Session

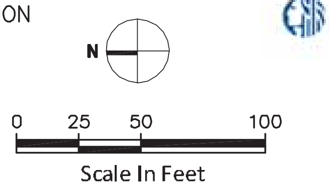
GSI Manual Volume II: Options Analysis, Appendix B
Sample of Preferred SPU Graphic of Outreach Plans of Potential Streets with
Roadside Bioretention for use at community block meetings



30th Ave SW: SW Barton St to SW Cambridge St

LEGEND

- – – PROPERTY LINE
- ▨ EXISTING BUILDING
- ○ TREE (EXISTING) IN ROW
- 🟩 POTENTIALLY FEASIBLE NDS ZONE
- 🟨 POTENTIAL CURB RAMP UPGRADE LOCATION
- ◠ POTENTIAL CURB BULB LOCATION



City of Seattle
KING COUNTY FLOOD CONTROL DISTRICT

MIG SvR

DRAFT October 2017 MIG|SvR #15077
Sheet 1 of 1

Plotted: Sep 28, 2017 – 12:36:01pm By justinm
File: G:\15c\15077 NDS\Current\LFC_Outreach exhibits plan view_round2.dwg Layout: 3B_30th-Bart-Camb-NO-UTIL

LONGFELLOW NATURAL DRAINAGE SYSTEMS

Plotted: Sep 28, 2017 – 12:35:22pm By justinm
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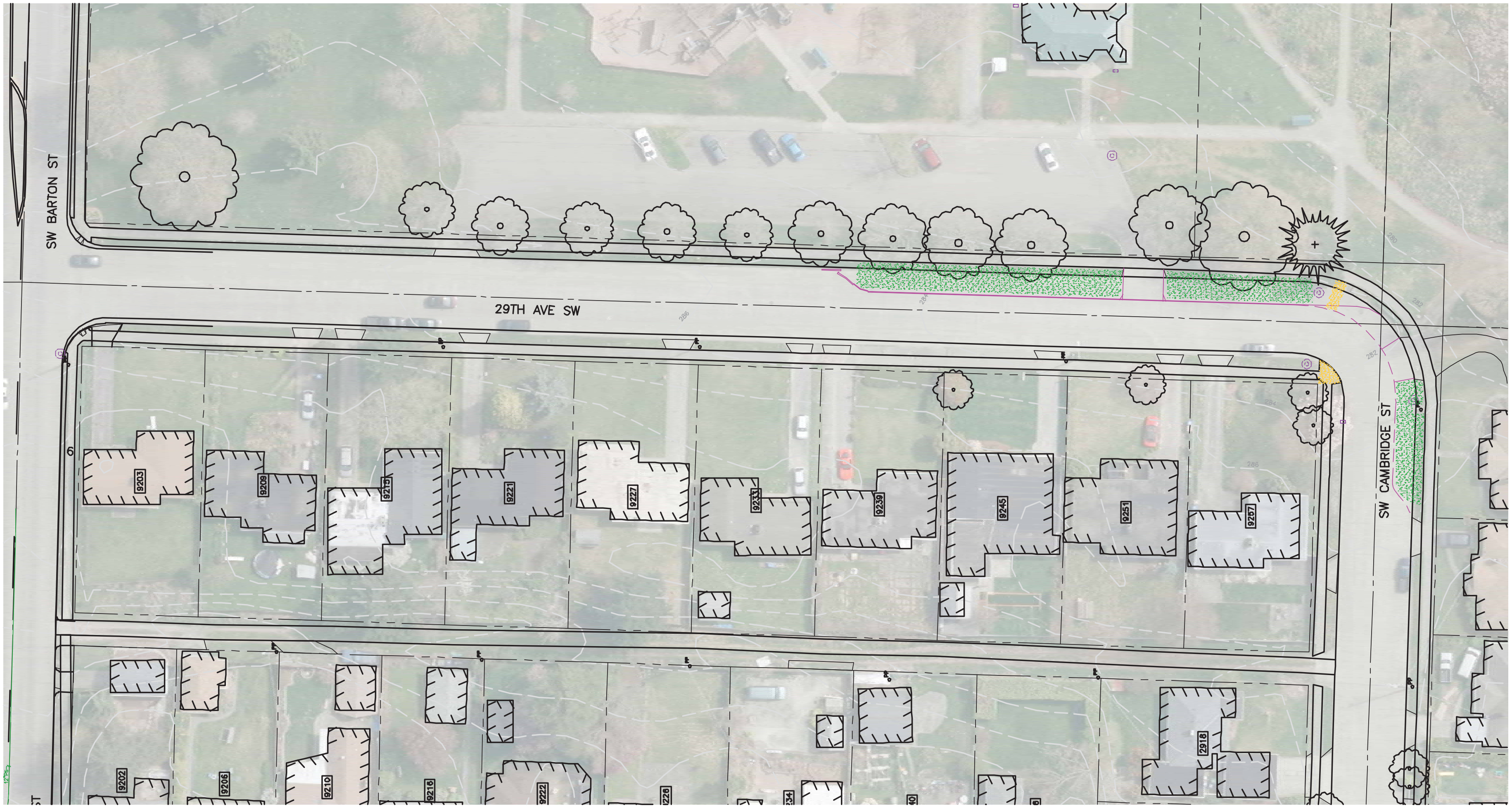


29th Ave SW: SW Barton St to SW Cambridge St

LEGEND

– – –	PROPERTY LINE
▨	EXISTING BUILDING
○	TREE (EXISTING) IN ROW
🟩	POTENTIALLY FEASIBLE NDS ZONE
🟨	POTENTIAL CURB RAMP UPGRADE LOCATION
◡	POTENTIAL CURB BULB LOCATION

N

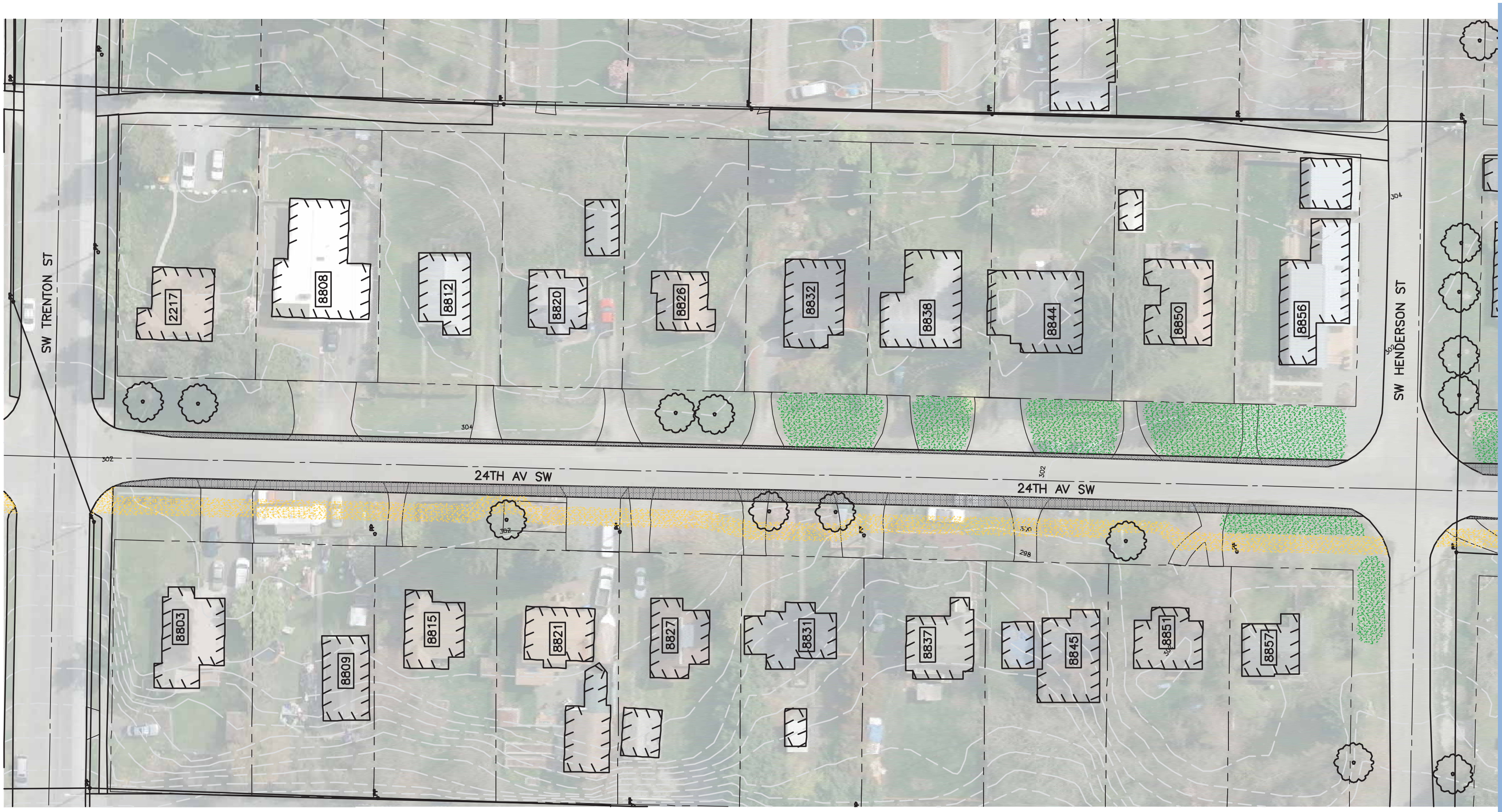
0 25 50 100
Scale In Feet

City of Seattle
KING COUNTY FLOOD CONTROL DISTRICT

MIG SvR

DRAFT October 2017 MIG|SvR #15077
Sheet 1 of 1

LONGFELLOW NATURAL DRAINAGE SYSTEMS



Plotted: Jul 13, 2017 – 9:27:59am By justinm
File: G:\15c\15077 NDS\Current\LFC_Outreach exhibits plan view_no utils.dwg Layout: 3_24th-Trenton-Henderson

LEGEND

- PROPERTY LINE
- POWER/FRANCHISE
- EXISTING BUILDING
- TREE (EXISTING) IN ROW
- 🟩 POTENTIALLY FEASIBLE NDS ZONE
- 🟨 POTENTIAL SIDEWALK LOCATION
- ▨ ROAD WIDENING

N

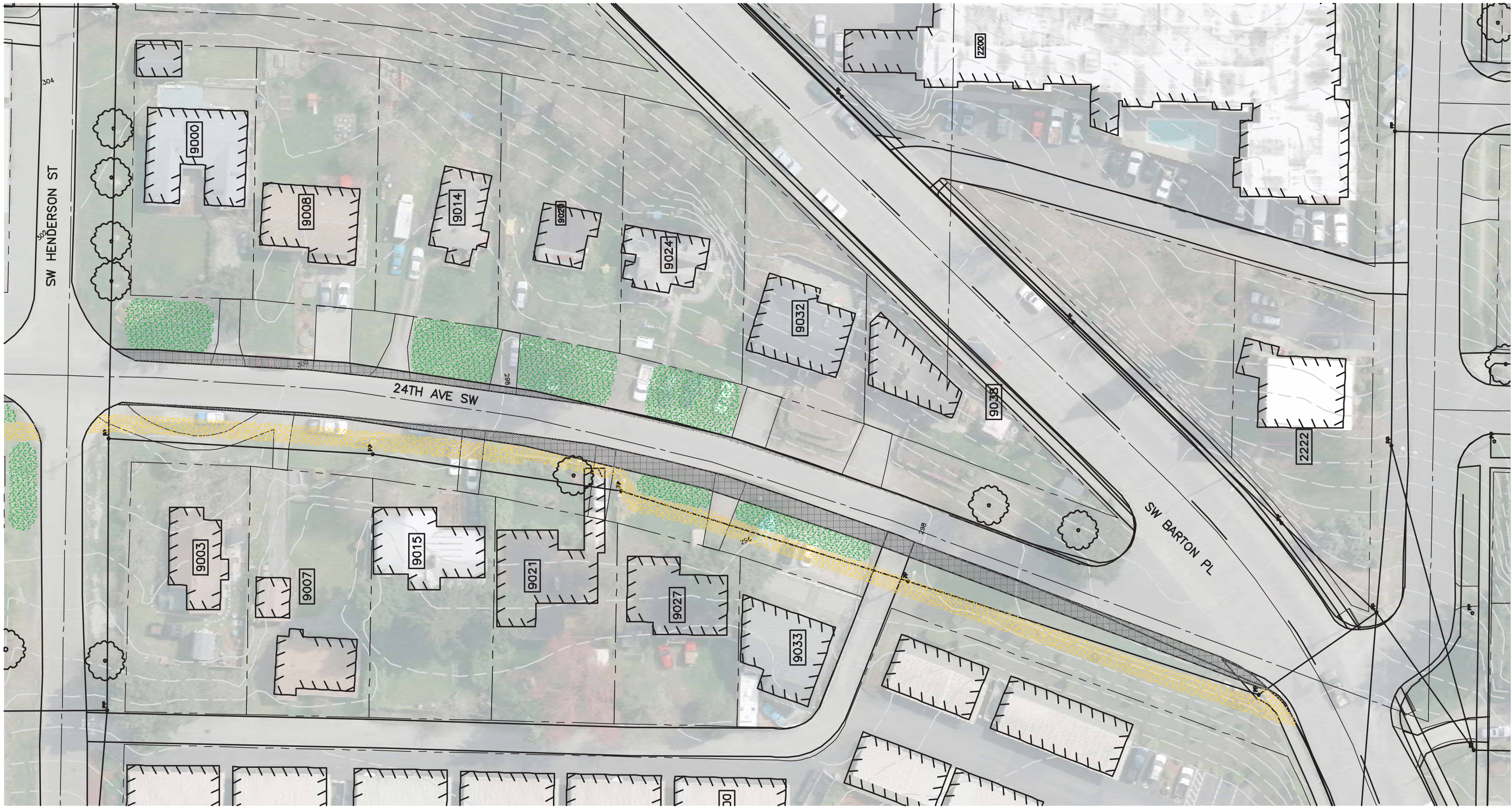
0 25 50 100
Scale In Feet

24th Ave SW: SW Henderson St to SW Trenton St

City of Seattle

KING COUNTY FLOOD CONTROL DISTRICT

7/102017 MIG|SvR #15077
Sheet 3 of 4



Plotted: Jul 13, 2017 – 9:28:23am By justinm
File: G:\15c\15077 NDS\Current\LFC_Outreach exhibits plan view_no utils.dwg Layout: 4_24th-Henderson-Barton

24th Ave SW: SW Barton St to SW Henderson St

LEGEND

- PROPERTY LINE
- POWER/FRANCHISE
- EXISTING BUILDING
- TREE (EXISTING) IN ROW
- 🟩 POTENTIALLY FEASIBLE NDS ZONE
- 🟨 POTENTIAL SIDEWALK LOCATION
- ▨ ROAD WIDENING

N

0 25 50 100
Scale In Feet

City of Seattle
KING COUNTY FLOOD CONTROL DISTRICT

MIG | SvR

7/10/2017 MIG|SvR #15077
Sheet 4 of 4

Attachment A: Mailing materials

May 16, 2017

Seattle Public Utilities (SPU) is working to reduce polluted runoff from entering our creeks and lakes, including Thornton Creek, Lake Washington, and Puget Sound. Polluted runoff is the greatest water quality threat to Puget Sound; it is estimated that more than 12 million pounds of pollution is carried into our waterways by stormwater every year.

One strategy SPU is using to solve this problem is to build Natural Drainage Systems (NDS). These engineered systems are connected cells of spongy dirt and plants that slow and clean water from the roadway and are built on the public right-of-way.

What does this mean to you?

The NDS program is coming to your neighborhood!

As SPU moves forward with identifying a specific set of project blocks, we will need to do additional analysis to confirm that each block is technically feasible. Project siting will prioritize projects that achieve multiple benefits for the community, such as helping to reduce flooding and calming traffic, in addition to meeting SPU's minimum water quality goals and requirements.

What's next?

With your input, SPU can design and build NDS projects that make your neighborhood a healthier, cleaner, and more enjoyable place to live. The attached questionnaire should take no more than 10 minutes to complete. After answering the questions, please return the survey to us using the enclosed envelope—no postage is required. If you prefer, you can complete the survey online by typing the following address into your browser: https://www.surveymonkey.com/r/ThorntonCreekBasin. **Please mail no later than June 2nd.** Thank you for participating.

Regards,

Luis Ramirez
Thornton Creek Natural Drainage Systems Project Manager
206.684.3660

Need your information in another language?

For interpretation services, please call (206) 684.3660.
如需要口譯服務，請撥電話號碼 (206) 684.3660.

통역 서비스를 원하시면 (206) 684.3660으로 전화하세요.

Para servicios de interpretación por favor llame al (206) 684.3660.
Về dịch vụ phiên dịch xin gọi (206) 684.3660.
Para sa serbisyo ng tagapagpaliwanag, tumawag sa (206) 684.3660.

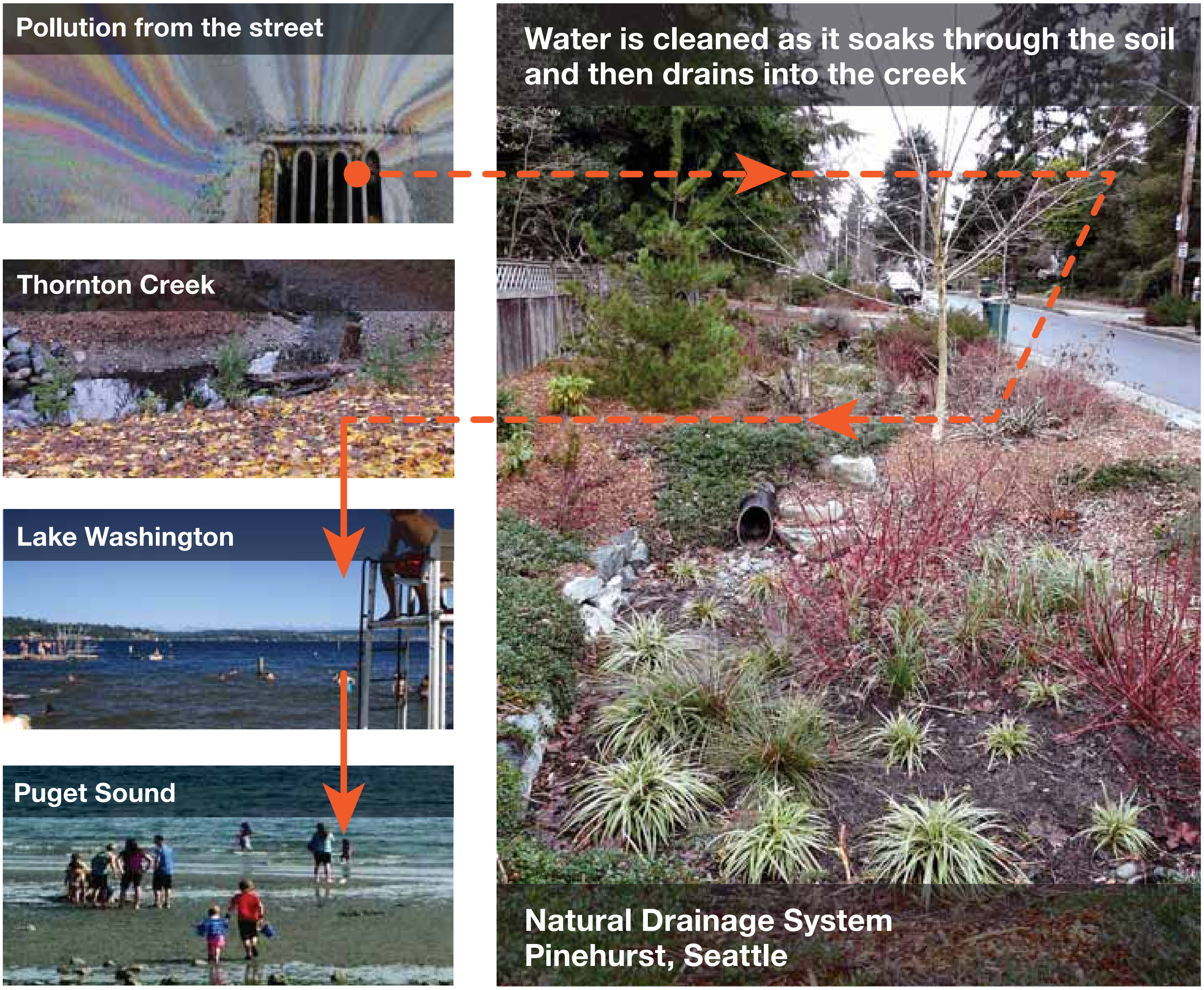
Improving Our Communities with Natural Drainage Systems

What Are They and Why Do We Need Them?

When it rains in this part of Seattle, pollution from our streets runs into Thornton Creek untreated. This is not healthy for the creek or for people. **The good news is: there is something we can do.**

Natural drainage systems capture and clean pollutants before they can reach the creek. Seattle Public Utilities is planning to build natural drainage systems in your neighborhood starting in 2019.

These systems are built in the public right-of-way between the street and property line. They capture, clean, and slow down stormwater.



Pollution from the street

Water is cleaned as it soaks through the soil and then drains into the creek

Thornton Creek

Lake Washington

Puget Sound

Natural Drainage System
Pinehurst, Seattle

We Want to Hear from You.

Please complete the enclosed survey. SPU is seeking locations to construct natural drainage systems in your neighborhood, and your input will help. Technical constraints will drive siting decisions, but SPU would like to go where people most want them. The survey should take no more than 10 minutes to complete.

Want to take it online or have other members of your household that would also like to take it?
Go here: https://www.surveymonkey.com/r/ThorntonCreekBasin

Need the survey in another language? Please call (206) 684.3660.

What Are the Benefits?

- Greener, more attractive neighborhoods
- Lower risk of street flooding
- Additional natural habitat for native plants and animal species
- Healthier creek ecosystem
- Calmer traffic patterns
- More street trees

For more information, please contact:

Luis Ramirez
206.684.3660
Luis.Ramirez@seattle.gov

What Is the NDS Program?

The Natural Drainage Systems Program is a SPU multi-year capital improvement program focused on Longfellow, Piper’s, and Thornton Creek watersheds.

All projects include plants that help the natural drainage systems do their job: infiltrate and clean stormwater. Plants also need to be able to thrive in the unique growing conditions of the natural drainage systems and be easy to maintain. The natural drainage systems are maintained by SPU.

For interpretation services, please call 206-684-3660
如需要口譯服務，請撥電話號碼 206-684-3660
통역 서비스를 원하시면 206-684-3660 으로 전화하세요
Para servicios de interpretación por favor llame al 206-684-3660
Về dịch vụ phiên dịch xin gọi 206-684-3660

Drainage in Your Neighborhood

If you prefer to take the survey in another language, please call (206) 684-3660.

If you prefer to complete the survey online or have other members of your household that would like to take the survey, please use this online link: www.surveymonkey.com/r/ThorntonCreekBasin

Drainage Problems in Your Neighborhood

1. How often do you have excess or standing water on your block even after the rain stops (for example, from a natural spring or high groundwater)?

☐ Never
☐ Occasionally, but less than once a year
☐ Once or twice a year
☐ More than twice a year
☐ I don't remember

2. How often do you have a problem with standing water on your property (for example, large puddles that last for several days)?

☐ Never
☐ Occasionally, but less than once a year
☐ Once or twice a year
☐ More than twice a year
☐ I don't remember

3. How often do you have problems with water in your basement or crawl space, such as natural springs, groundwater, or other sources of outside water seeping into those areas?

☐ Never
☐ Occasionally, but less than once a year
☐ Once or twice a year
☐ More than twice a year
☐ I don't remember
☐ I don't have a basement or crawl space

Natural Drainage Solutions in Your Neighborhood

Seattle Public Utilities (SPU) is seeking locations to construct Natural Drainage Systems in planting strips in the public rights-of-way in your neighborhood to help reduce polluted runoff from entering local creeks and lakes. There may be technical limitations for where we can install these systems, and this will drive final decision-making. SPU would like to place them where people most want them. Providing your contact information on the next page will enable us to gather input by location.

4. Knowing what you know now, how much do you support a project like this on your block?

☐ Very supportive
☐ Somewhat supportive
☐ Neutral (neither supportive nor unsupportive)
☐ Somewhat unsupportive
☐ Very unsupportive

5. Knowing what you know now, how much do you support a project like this in front of your house?

☐ Very supportive
☐ Somewhat supportive
☐ Neutral (neither supportive nor unsupportive)
☐ Somewhat unsupportive
☐ Very unsupportive

6. Natural drainage systems are not suitable for houses with street parking reserved for ADA access (Americans with Disabilities Act). Does someone in your household require ADA access?

☐ Yes ☐ No ☐ I'm not sure ☐ Decline to answer

7. Please provide your contact information to help us track level of support for the project by house location.

Name: ☐

Phone: ☐

Email: ☐

Address: ☐

SPU will keep your information until specific Natural Drainage Systems sites in your neighborhood have been selected and construction on this project is complete. Names, addresses, contact, and other information you provide to Seattle Public Utilities are subject to disclosure when requested under the Public Records Act (RCW 42.56); the law prohibits their use for commercial purposes. To learn more about the City's privacy policies please visit www.Seattle.gov/tech/initiatives/privacy.

Staying in Touch

8. Would you like Seattle Public Utilities to stay in touch about this effort?

- ☐ Yes
- ☐ No
- ☐ I'm not sure
- ☐ Decline to answer

9. How would you prefer Seattle Public Utilities to keep you informed about this effort? (Choose all that apply)

- ☐ Direct mail
- ☐ Community drop-in sessions or events
- ☐ Email distribution list
- ☐ Project website: www.seattle.gov/util/thorntonNDS
- ☐ Northeast Seattle Blog
- ☐ Lake City Live
- ☐ Maple Leaf Life
- ☐ Phone
- ☐ Door hanger
- ☐ Project signs placed in my neighborhood
- ☐ Project representative visits to my home
- ☐ Other, please specify:

Thank you very much for your participation. When your survey is complete, please put it in the enclosed self-addressed envelope. Postage is already paid. PLEASE MAIL NO LATER THAN JUNE 2.

Attachment C: SNAP, Spotio, and SurveyMonkey Surveys

Drainage in Your Neighborhood

If you prefer to take the survey in another language, please call (206) 684-3660.

If you prefer to complete the survey online or have other members of your household that would like to take the survey, please use this online link: www.surveymonkey.com/r/ThorntonCreekBasin

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☐ Once or twice a year
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☐ I don't remember

2. How often do you have a problem with standing water on your property (for example, large puddles that last for several days)?

☐ Never
☐ Occasionally, but less than once a year
☐ Once or twice a year
☐ More than twice a year
☐ I don't remember

3. How often do you have problems with water in your basement or crawl space, such as natural springs, groundwater, or other sources of outside water seeping into those areas?

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☐ More than twice a year
☐ I don't remember
☐ I don't have a basement or crawl space

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☐ Very supportive
☐ Somewhat supportive
☐ Neutral (neither supportive nor unsupportive)
☐ Somewhat unsupportive
☐ Very unsupportive

5. Knowing what you know now, how much do you support a project like this in front of your house?

☐ Very supportive
☐ Somewhat supportive
☐ Neutral (neither supportive nor unsupportive)
☐ Somewhat unsupportive
☐ Very unsupportive

6. Natural drainage systems are not suitable for houses with street parking reserved for ADA access (Americans with Disabilities Act). Does someone in your household require ADA access?

☐ Yes ☐ No ☐ I'm not sure ☐ Decline to answer

7. Please provide your contact information to help us track level of support for the project by house location.

Name: ☐

Phone: ☐

Email: ☐

Address: ☐

SPU will keep your information until specific Natural Drainage Systems sites in your neighborhood have been selected and construction on this project is complete. Names, addresses, contact, and other information you provide to Seattle Public Utilities are subject to disclosure when requested under the Public Records Act (RCW 42.56); the law prohibits their use for commercial purposes. To learn more about the City's privacy policies please visit www.Seattle.gov/tech/initiatives/privacy.

Staying in Touch

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- ☐ Yes
- ☐ No
- ☐ I'm not sure
- ☐ Decline to answer

9. How would you prefer Seattle Public Utilities to keep you informed about this effort? (Choose all that apply)

- ☐ Direct mail
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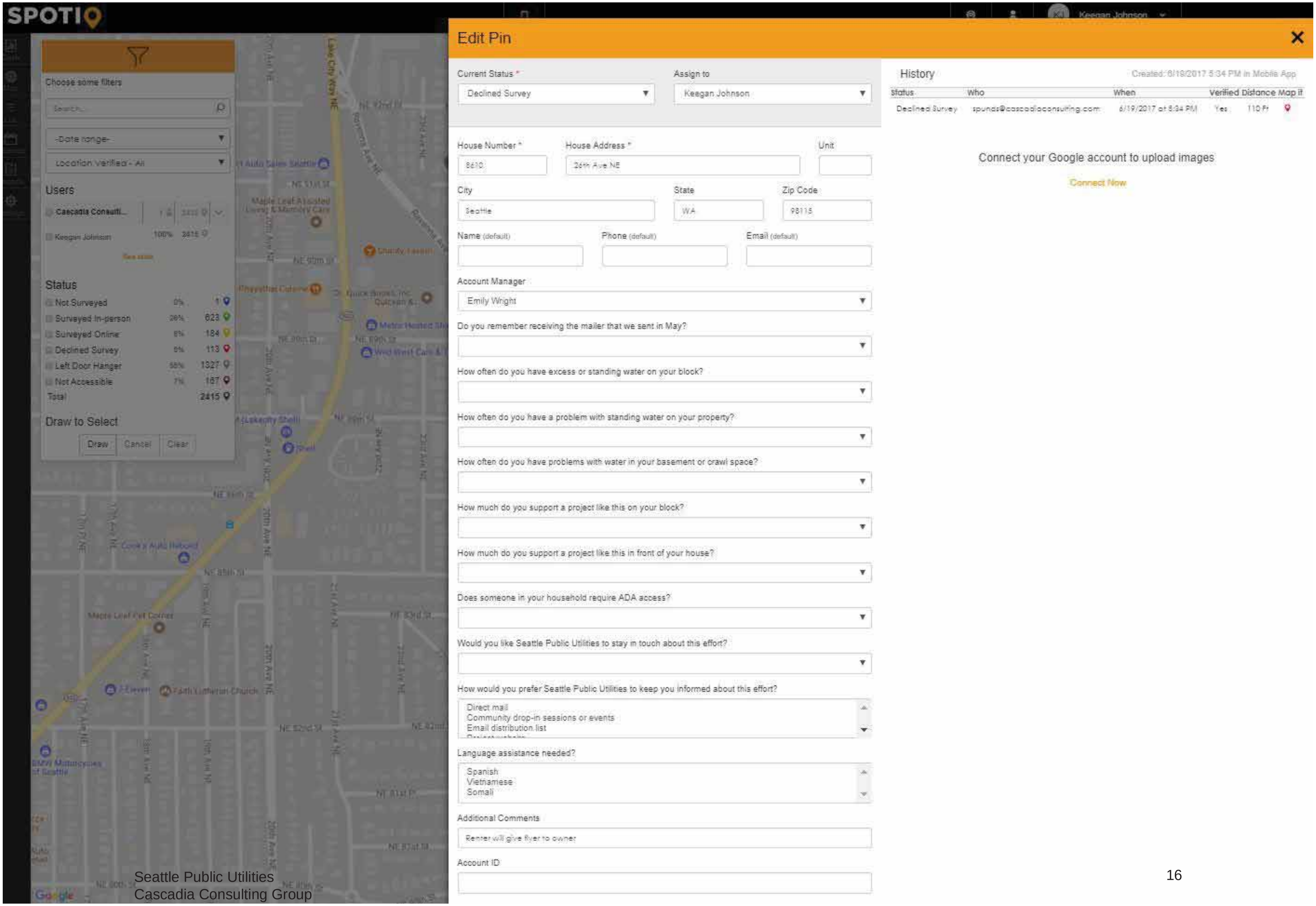
- ☐ Maple Leaf Life
- ☐ Phone
- ☐ Door hanger
- ☐ Project signs placed in my neighborhood
- ☐ Project representative visits to my home
- ☐ Other, please specify:

☐

Thank you very much for your participation. When your survey is complete, please put it in the enclosed self-addressed envelope. Postage is already paid. PLEASE MAIL NO LATER THAN JUNE 2.



Status			
Not Surveyed	0%	1	
Surveyed In-person	26%	623	
Surveyed Online	8%	184	
Declined Survey	5%	113	
Left Door Hanger	55%	1327	
Not Accessible	7%	167	
Total		2415	

Users		
Keegan Johnson	100%	2415

Edit Pin

Current Status *: Declined Survey

Assign to: Keegan Johnson

House Number *: 8610

House Address *: 26th Ave NE

Unit:

City: Seattle

State: WA

Zip Code: 98115

Name (default):

Phone (default):

Email (default):

Account Manager: Emily Wright

Do you remember receiving the mailer that we sent in May?

How often do you have excess or standing water on your block?

How often do you have a problem with standing water on your property?

How often do you have problems with water in your basement or crawl space?

How much do you support a project like this on your block?

How much do you support a project like this in front of your house?

Does someone in your household require ADA access?

Would you like Seattle Public Utilities to stay in touch about this effort?

How would you prefer Seattle Public Utilities to keep you informed about this effort?

- Direct mail
- Community drop-in sessions or events
- Email distribution list

Language assistance needed?

- Spanish
- Vietnamese
- Somali

Additional Comments: Renter will give flyer to owner

Account ID:

History

Created: 6/19/2017 5:34 PM in Mobile App

Status	Who	When	Verified	Distance	Map it
Declined Survey	spunds@cascadiaconsulting.com	6/19/2017 at 5:34 PM	Yes	110 Ft	

Connect your Google account to upload images

Connect Now

Introduction

Seattle Public Utilities (SPU) is working to reduce polluted runoff from entering our creeks, lakes, and Puget Sound. Polluted runoff is the greatest water quality threat to Puget Sound. It is estimated that more than 12 million pounds of pollution are carried into our waterways by stormwater every year. One strategy SPU is using to reduce runoff is to build Natural Drainage Systems (NDS). NDS are engineered systems with connected cells of spongy dirt and plants that slow and clean water from the roadway and are built on the public right-of-way.

What does this mean to you?

The NDS program is coming to your neighborhood, and we need your input. With your input, SPU can design and build natural drainage projects that make your neighborhood a healthier, cleaner, and more enjoyable place to live.

Please fill out this quick survey. It should take no more than 10 minutes to complete. Thank you for participating!

Drainage Problems in Your Neighborhood

1. How often do you have excess or standing water on your block even after the rain stops (for example, from a natural spring or high groundwater)?

○ Never

○ Occasionally, but less than once a year

○ Once or twice a year

○ More than twice a year

○ I don't remember

2. How often do you have a problem with standing water on your property (for example, large puddles that last for several days)?

○ Never

○ Occasionally, but less than once a year

○ Once or twice a year

○ More than twice a year

○ I don't remember

3. How often do you have problems with water in your basement or crawl space, such as natural springs, groundwater, or other sources of outside water seeping into those areas?

○ Never
○ Occasionally, but less than once a year
○ Once or twice a year
○ More than twice a year
○ I don't remember
○ I don't have a basement or crawl space

Natural Drainage Solutions in Your Neighborhood

Seattle Public Utilities (SPU) is seeking locations to construct natural drainage systems in planting strips in the public rights-of-way in your neighborhood to help reduce polluted runoff from entering local creeks and lakes. There may be technical limitations for where we can install these systems, and this will drive final decision-making. SPU would like to place them where people most want them. Providing your contact information below will enable us to gather input by location.

4. Knowing what you know now, how much do you support a project like this on your block?

○ Very supportive
○ Somewhat supportive
○ Neutral (neither supportive nor unsupportive)
○ Somewhat unsupportive
○ Very unsupportive

5. Knowing what you know now, how much do you support a project like this in front of your house?

○ Very supportive
○ Somewhat supportive
○ Neutral (neither supportive nor unsupportive)
○ Somewhat unsupportive
○ Very unsupportive

6. Natural drainage systems are not suitable for houses with street parking reserved for ADA access (Americans with Disabilities Act). Does someone in your household require ADA access?

○ Yes

○ No

○ I'm not sure

○ Decline to answer

7. Please provide your contact information to help us track level of support for the project by house location.

Name	
Email	
Phone	
Address	

SPU will keep your information until specific Natural Drainage Systems sites in your neighborhood have been selected and construction on this project is complete. Names, addresses, contact, and other information you provide to Seattle Public Utilities are subject to disclosure when requested under the Public Records Act (RCW 42.56); the law prohibits their use for commercial purposes. To learn more about the City’s privacy policies please visit www.Seattle.gov/tech/initiatives/privacy.

Staying in Touch

8. Would you like Seattle Public Utilities to stay in touch about this effort?

○ Yes

○ No

○ Undecided

○ Decline to answer

9. How would you like Seattle Public Utilities to keep you informed about this effort? (Choose all that apply)

☐ Direct mail

☐ Community drop-in sessions or events

☐ Email distribution list

☐ Project website: www.seattle.gov/util/thorntonNDS

☐ Northeast Seattle Blog

☐ Lake City Live

☐ Maple Leaf Life

☐ Phone

☐ Door hanger

☐ Project signs placed in my neighborhood

☐ Project representative visits to my home

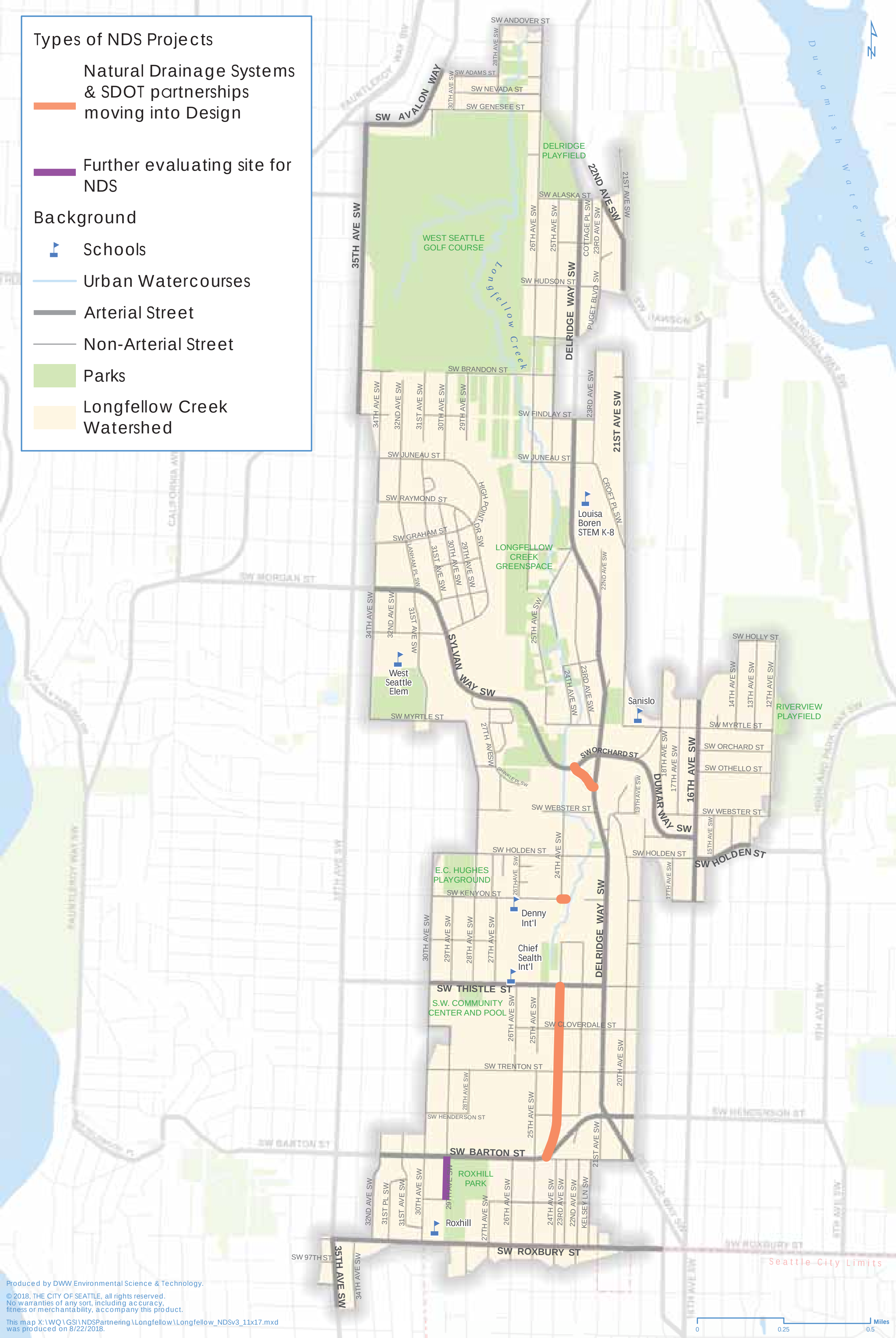
☐ Other (please specify)

Thank you!

Your responses have been recorded. Thank you very much for your participation!

Seattle Public Utilities

Longfellow Natural Drainage Systems



Produced by DWW Environmental Science & Technology.

This map X:\WQ\GSI\NDSPartnering\Longfellow\Longfellow_NDSv3_11x17.mxd
was produced on 8/22/2018.

Appendix C: Sample SPU Design Guidance Document

- Sample SPU document for defining Design Criteria for SPU's Natural Drainage System Partnering CIPs in Creek Basins.

Seattle Public Utilities
NATURAL DRAINAGE SYSTEMS PARTNERING

GENERAL DESIGN GUIDANCE

Date: August 2017

Site Location:
Creek Watersheds (Longfellow Creek, Thornton Creek, Pipers Creek)

Prepared by:
Seattle Public Utilities
700 5th Avenue, Suite 4500
Seattle, WA 98104
Greg Stevens, Project Engineer:
Phone: 206-615-1451

Table of Contents

1 PURPOSE

The purpose of this technical memorandum is to provide general design guidance for the Natural Drainage System (NDS) Partnering projects in the Creek Watersheds (Longfellow Creek, Thornton Creek, Piper's Creek).

The following sections identify the general program goals, applicable codes and standards, deviations from standards, and criteria and assumptions for the NDS Partnering projects. Project teams should use this document as a starting point for creating a project Basis of Design document which details project specific design standard and deviation, major design criteria, and design decisions. Any deviation requires GSI Program Team approval.

2 GOALS

All projects must meet the critical program goals to be under the NDS partnering program. The following Table shows both the critical program goals and the desired project performance goals.

Table 1: Program and Project Performance Goals

<table>
<tr><th colspan="3">Critical Program Goals</th></tr>
<tr><th>No.</th><th>Item (Source)</th><th>Value</th></tr>
<tr><td>1.</td><td>Water quality treatment goal</td><td>Provide enhanced water quality treatment of stormwater runoff from the selected project site by infiltrating, at a minimum, 80% of the Average Annual Runoff Volume through the bioretention system. The 80% is what was agreed to in the Integrated Plan, it is not consistent with Stormwater code, which requires treatment of 91% of the AARV. Modeling of bioretention with side slopes has been done to show that the IP goal is achieved for facilities without an underdrain using a bottom area sizing factor as shown below:
<table>
<tr><th>Bioretention Bottom Width (feet)</th><th>Bottom Area Sizing Factor</th></tr>
<tr><td>1</td><td>0.7%</td></tr>
<tr><td>1.5</td><td>1.0%</td></tr>
<tr><td>2.5</td><td>1.3%</td></tr>
<tr><td>4</td><td>1.7%</td></tr>
</table>
For facilities with an underdrain use a bottom area sizing factor of 0.8%. If using this sizing factor requires the use of vertical walls or other techniques, such as bump outs where they aren't desired for traffic calming benefits, the sizing factor may be reduced to allow the use of bioretention with side slopes, but must be a minimum of 0.3%.[1]</td></tr>
<tr><td>2.</td><td>Stormwater Volume Reduction goal</td><td>Infiltrate at a minimum 40% of Average Annual Volume of stormwater runoff tributary to the bioretention cells into the underlying soil. (This minimum volume represents the capacity of un-lined bioretention cells with an underdrain pipe to infiltrate into the underlying soil. In figuring out how to meet this goal, the project should assume that it is met if the cells are unlined. If some cells are lined, then the project would want to look for and prioritize opportunities to have bioretention without an underdrain.)</td></tr>
</table>

---

[1] From MIG SVR (2017) Memorandum "Sizing Factor for SPU NDS Projects Task 7.1.1 – SPU GSI Technical Analysis Support"

3.	Creek Basin Conveyance Goal	From the 2004 Comprehensive Drainage Plan, but with single event storm event converted to facilitate use of continuous modeling (note: "customer experience" is a plain speak version of continuous modeling methodology's report of the statistical flood frequency): • Manage stormwater runoff within the city right-of-way to protect public safety and buildings (e.g., residences and businesses), targeting the 25-year customer experience. • Manage stormwater runoff within the city right-of-way to allow access to and functionality of critical services such as hospitals, fire stations, and schools targeting the 100-year customer experience. • Manage stormwater runoff within the city right-of-way to protect public safety and support mobility on major transportation routes (arterial roads) targeting the 25-year customer experience. The standard in the DS&G are to provide conveyance capacity for the peak flows with a 4-year annual probability within a quarter mile downstream. The standard detail and design guidance for bioretention facilities will provide the 25-year customer experience and additional modeling at the planning level is not required. Modeling during design would be required to confirm we are meeting our Level of Service (LOS). For portions of the design that are not including bioretention facilities, such as conveyance swales or culverts, the program is in the process of developing guidance for quick evaluation of LOS. If designing to meet a 25-year LOS is not easily accomplished or adds in significant costs, the LOS may be reduces to no less than the 10-year LOS.
4.	Peak flow Control Goal	Do not create adverse effect to the conveyance system downstream of the discharge point. For project sites changing more than one blocks connection of existing impervious surfaces to the downstream conveyance system, verify through modeling peak two-, five- and 25-year flood frequencies from the entire contributing drainage area post project to be less than or equal to 'existing'. Existing conditions do not need to be monitored, they can be represented from typical effective impervious area of the sub basin as found in Appendix H of the GSI Manual: Volume III – Design.
5	Climate Resiliency	Follow Policy: Not applicable as of Dec 2016

3 APPLICABLE CODES AND STANDARDS

NDS Partnering design shall be based on the most current codes and standards adopted by SPU. This includes design details developed and approved through a joint SPU and King

County GSI BMP Interdepartmental Team (IDT), and the standards and requirements contained in the following table:

Table 2: Standards, Code, and Requirements

Standard, Codes and Requirements*	Scope of Item
COS standard plans (COS 2014 and 2017 when available)	Standard plans that apply whenever public or private construction is performed in the Seattle right-of-way
COS standard specifications (COS 2014 and 2017 when available)	Standard specifications that apply whenever public or private construction is performed in the Seattle right-of-way
SPU CAM 1180	Design Guidelines for Public Storm Facilities
City of Seattle Stormwater Manual (COS 2016)	Design requirements for stormwater systems, including flow control, water quality, and general GSI design
SPU GSI Manual Volume 2 – Options Analysis (SPU 2014), Volume 3 – Design (SPU 2015)	Design guidance for implementing GSI technologies in the public right-of-way that are constructed via SPU or King County WTD-led GSI capital projects
Seattle Right-of-Way Improvements Manual (SDOT 2016)	Street design requirements
City of Seattle Street and Sidewalk Opening and Restoration rule (SDOT 2009)	Street restoration requirements

* These references will be updated when newer versions become available

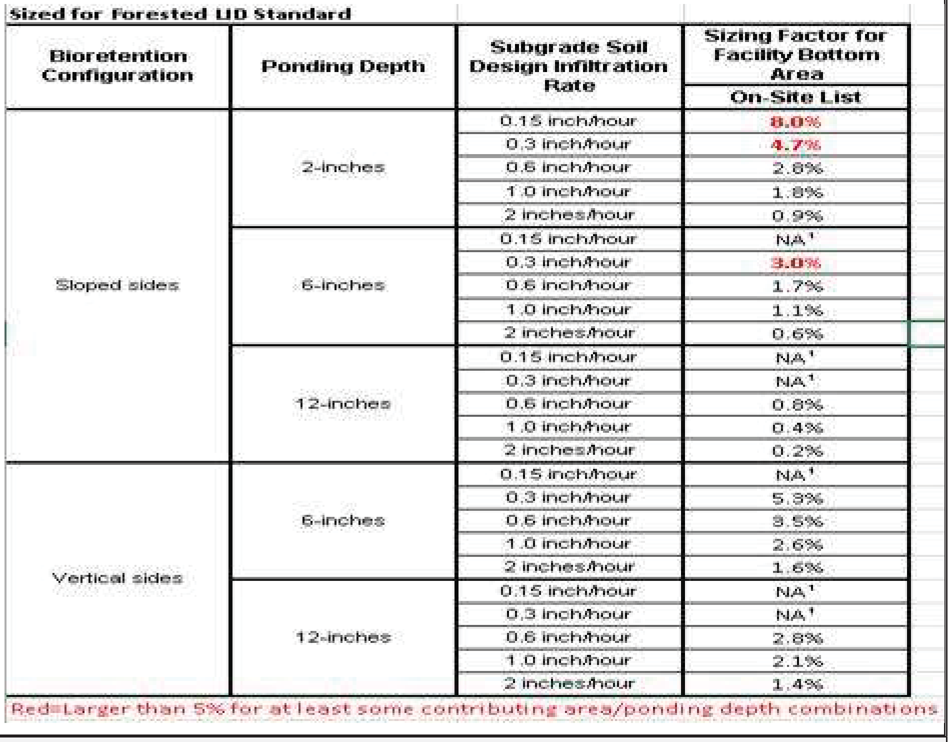
Design Criteria and Requirements

The following table provides the design criteria and requirements applicable to designing NDS partnering projects. This list is not exhaustive and it is the team's responsibility to verify all applicable requirements.

Table 3: Summary List of Design Criteria and Requirements

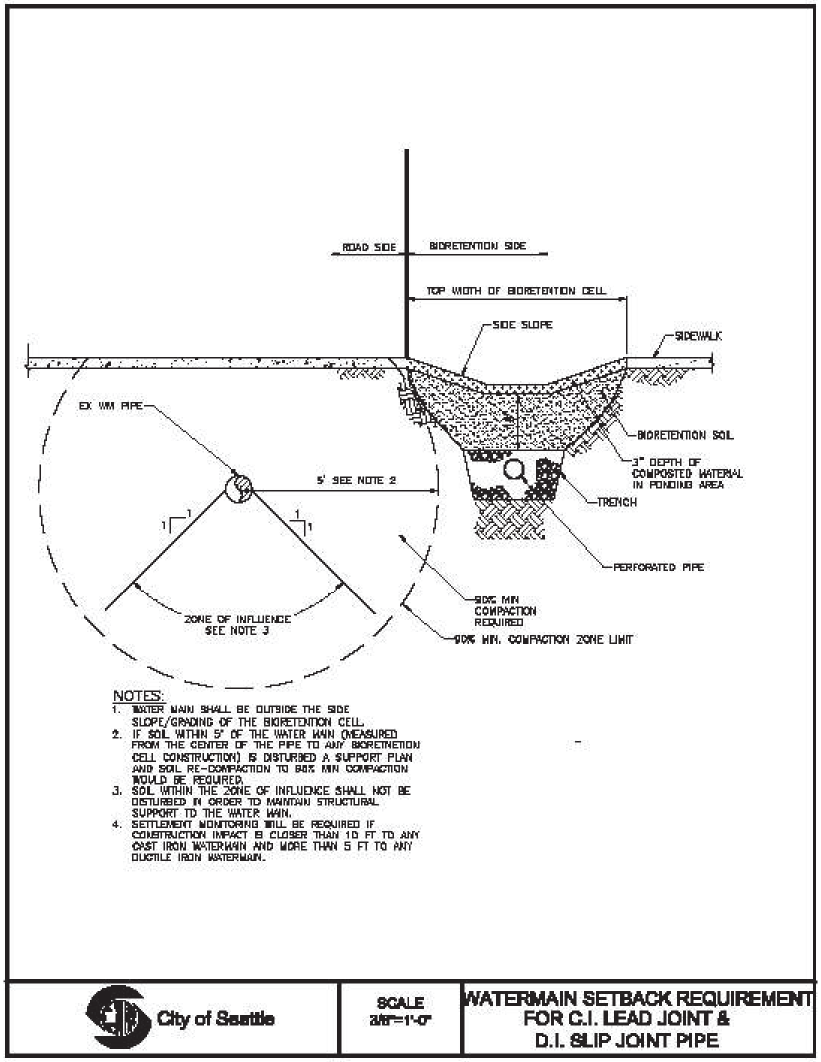
Stormwater Code Compliance Summary for projects within non-listed creeks. For more detailed info see *City of Seattle Stormwater Manual (City of Seattle 2016)*		
1.	On-Site Requirements	All trail and sidewalk projects and roadway projects with 2,000 square feet or more of new plus replaced hard surface shall comply with this requirement. This requirement includes soil amendment of all new, replaced, and disturbed topsoil, including construction lay-down areas, in addition to construction of an on-site BMP sized per the on-site list sizing or the on-site performance standard.

2.	Flow Control Requirements	All roadway projects shall provide flow control to meet the pre-developed Pasture Standard if the total new plus replaced hard surface is 10,000 sf or more. A sidewalk project becomes a roadway project if the total new plus replaced hard surface in the roadway (curb to curb) exceeds 10,000 square feet. Flow control BMPs can be sized per the pre-sized approach (only applicable for projects with less than 10,000 sf of new plus replaced hard surface) or the modeling approach.
3.	Water Quality Requirements	All roadway projects shall provide water quality treatment for the total new pollution-generating hard surface (PGHS) and new pollution-generating pervious surface (PGPS) if the new PGHS is 5,000 sf or more.
Bioretention Cells Design Criteria (per 2016 Stormwater Manual Volume 3 Chapter 5)		
4.	**Tributary to Bioretention Cell**	• No single cell may receive runoff from more than 5,000 square feet of impervious area. • The bioretention cell system (interconnected series of cells) should be sized for the contributing area routed to the facility and shall not be oversized.

<table>
<tr><td>5.</td><td>Presizing information
(generally not required, only applicable if project needs to meet water quality for stormwater code compliance)</td><td>• The Stormwater Code On-Site Stormwater Management Requirements shall be met by documenting achievement of the LID performance standard (1%-10% post project flow exceedance values at the predeveloped pasture rate). Presizing information for the slightly larger standard (1%-10% post project flow exceedance values at the predeveloped forested rate) has been developed and is provided below as a conservative rule of thumb.

Sized for Forested LID Standard
<table>
<tr><th>Bioretention Configuration</th><th>Ponding Depth</th><th>Subgrade Soil Design Infiltration Rate</th><th>Sizing Factor for Facility Bottom Area
On-Site List</th></tr>
<tr><td>Sloped sides</td><td>2-inches</td><td>0.15 inch/hour</td><td>8.0%</td></tr>
<tr><td></td><td></td><td>0.3 inch/hour</td><td>4.7%</td></tr>
<tr><td></td><td></td><td>0.6 inch/hour</td><td>2.8%</td></tr>
<tr><td></td><td></td><td>1.0 inch/hour</td><td>1.8%</td></tr>
<tr><td></td><td></td><td>2 inches/hour</td><td>0.9%</td></tr>
<tr><td></td><td>6-inches</td><td>0.15 inch/hour</td><td>NA¹</td></tr>
<tr><td></td><td></td><td>0.3 inch/hour</td><td>3.0%</td></tr>
<tr><td></td><td></td><td>0.6 inch/hour</td><td>1.7%</td></tr>
<tr><td></td><td></td><td>1.0 inch/hour</td><td>1.1%</td></tr>
<tr><td></td><td></td><td>2 inches/hour</td><td>0.6%</td></tr>
<tr><td></td><td>12-inches</td><td>0.15 inch/hour</td><td>NA¹</td></tr>
<tr><td></td><td></td><td>0.3 inch/hour</td><td>NA¹</td></tr>
<tr><td></td><td></td><td>0.6 inch/hour</td><td>0.8%</td></tr>
<tr><td></td><td></td><td>1.0 inch/hour</td><td>0.4%</td></tr>
<tr><td></td><td></td><td>2 inches/hour</td><td>0.2%</td></tr>
<tr><td>Vertical sides</td><td>6-inches</td><td>0.15 inch/hour</td><td>NA¹</td></tr>
<tr><td></td><td></td><td>0.3 inch/hour</td><td>5.3%</td></tr>
<tr><td></td><td></td><td>0.6 inch/hour</td><td>3.5%</td></tr>
<tr><td></td><td></td><td>1.0 inch/hour</td><td>2.6%</td></tr>
<tr><td></td><td></td><td>2 inches/hour</td><td>1.6%</td></tr>
<tr><td></td><td>12-inches</td><td>0.15 inch/hour</td><td>NA¹</td></tr>
<tr><td></td><td></td><td>0.3 inch/hour</td><td>NA¹</td></tr>
<tr><td></td><td></td><td>0.6 inch/hour</td><td>2.8%</td></tr>
<tr><td></td><td></td><td>1.0 inch/hour</td><td>2.1%</td></tr>
<tr><td></td><td></td><td>2 inches/hour</td><td>1.4%</td></tr>
</table>
Red=Larger than 5% for at least some contributing area/ponding depth combinations</td></tr>
<tr><td colspan="3">Other Design Criteria</td></tr>
<tr><td>6.</td><td>NDS Partnering Eligibility Requirements</td><td>• Project must manage ≥ 3,000 sf PGHS beyond what is required for Code</td></tr>
<tr><td>7.</td><td>Pit drains</td><td>If approved for use by SPU Pit drains shall be designed by a licensed geotechnical engineer. Pit Drain Design Siting see SPU GSI Design Manual Section 10.2.</td></tr>
<tr><td>8.</td><td>Drill Drain/UIC</td><td>If approved for use by SPU Drill Drain/UIC shall be designed by the geotechnical engineer. For Drill Drain/UIC Siting see SPU GSI Design Manual Section 10.1.</td></tr>
</table>

9.	Presettling	For Residential Street Bioretention cells with less than 360 linear feet of tributary gutter flow or 6,700 square feet or less of right-of-way impervious area (road and sidewalk) AND less than 5,000 square feet Pollution Generating Impervious Surface (PGIS) do not need presettling; however, erosion protection and flow dispersion for runoff entering the system is required. For all other scenarios, presettling may be required. See Volume 3 of the Stormwater Manual.
10.	Bioretention Cell area	• Maximum bottom area of individual cell is 800 square feet. • Minimum bottom area of individual cell is 4 square feet. The top area of the bioretention facilities must be ≥ 500 sf or there must be additional bioretention facilities within 2 blocks so that the total top area is ≥ 500 sf.
11.	Bioretention cell bottom rate	Minimum average bottom width is 1’.
12.	Bioretention cell side slopes	Planting side slope of cell is 2.5H:1V or flatter, except for cells on curbless roads or within 50 feet of an intersection, the side slope on the road side must be 3H:1V or flatter.
13.	Temporary ponding depth	Maximum ponding depth is 12 inches. In ROW areas with high pedestrian traffic, the ponding depth may be restricted to 6 inches or less.
14.	Freeboard	The minimum freeboard measured from the invert of the overflow point (e.g., standpipe, earthen channel, curb cut) or 25-year recurrence interval water surface elevation (as specified below) to the lowest overtopping elevation of the facility is: • 2 inches measured from the invert of the overflow point for contributing drainage areas less than 3,000 square feet • 4 inches measured from the invert of the overflow point for contributing drainage areas from 3,000 square feet to 5,000 square feet • 6 inches measured from the invert of the overflow point for contributing drainage areas from greater than 5,000 square feet to 10,000 square feet • 6 inches measured from the 25-year recurrence interval water surface elevation (demonstrated with hydrologic modeling) for contributing drainage areas greater than 10,000 square feet • With a curb and gutter, freeboard may be reduced if the project can demonstrate that any overtopping of the facility for larger events (greater than the 25-yr recurrence interval) would be consistent with Section 4.3.4.

15.	Longitudinal slope of cell bottom	The permitted longitudinal slope of the cell bottom ranges 0.0% to 3.0%. In most cases, the slope of the cell bottom will match the slope of the adjacent roadway. In areas where the roadway slope exceeds 3%, weirs will be periodically spaced along the cell to maintain the minimum and maximum cell depth requirements.
16.	Subgrade infiltration rate	• The minimum measured subgrade infiltration rate for bioretention cells without an underdrain is 0.6 inches per hour. For rates less than 0.6 inches per hour, an underdrain must be used. • The minimum measured subgrade infiltration rate for bioretention cells with an underdrain is 0.3 inches per hour where used to meet the On-site List Approach (there is no minimum rate where used to meet other standards).
17.	Drawdown time	Maximum drawdown time is 24 hours.
18.	Bioretention soil mix type	Current City of Seattle Standard Specification 7-21, GSP
19.	Bioretention soil mix thickness	18 inches min for enhanced water quality treatment.
20.	Bioretention soil mix porosity	For facility sizing with model approach use 30% as porosity.
21.	Bioretention soil infiltration rate	Design infiltration rate is 6 inches per hour.
Setbacks and Utility Cover Requirement (per COS GSI manual Volume II & III)		
22.	Sidewalk	• New side walk is 6’ wide per COS STD 420. • If non-standard width sidewalks exist, provide 7’ set back from Right of Way line before starting the cell side slope for future installation of standard width sidewalk.
23.	Driveway	Reduce to 10’ wide if it is wider than 10’ and is a residential use. Provide 2 foot minimum shoulder before grading side slope of Cell.

24.	Water	- General – Minimum cover (on all sides of the pipe) shall be maintained for all WMs according to COS Std. Plan 30. - Cast iron with lead joints and ductile iron with slip joints – Per guidance in GSI Manual Volume III – Design, place water mains outside the side slope of the bioretention cell or rain garden. Maintain 5-ft minimum separation as measured from the center of the pipe to any bioretention cell or rain garden construction. Soil within the minimum separation zone and the zone of influence of the pipe shall not be disturbed. If the soil is disturbed, a support plan and soil re-compaction to 95% minimum compaction would be required. Zone of influence of the water main is a plane from the spring line of the pipe extending down and away from the main at a 1 to 1 slope.  NOTES: 1. WATER MAIN SHALL BE OUTSIDE THE SIDE SLOPE/GRADING OF THE BIORETENTION CELL. 2. IF SOIL WITHIN 5' OF THE WATER MAIN (MEASURED FROM THE CENTER OF THE PIPE TO ANY BIORETNETION CELL CONSTRUCTION) IS DISTURBED A SUPPORT PLAN AND SOIL RE-COMPACTION TO 90% MIN COMPACTION WOULD BE REQUIRED. 3. SOIL WITHIN THE ZONE OF INFLUENCE SHALL NOT BE DISTURBED IN ORDER TO MAINTAIN STRUCTURAL SUPPORT TO THE WATER MAIN. 4. SETTLEMENT MONITORING WILL BE REQUIRED IF CONSTRUCTION IMPACT IS CLOSER THAN 10 FT TO ANY CAST IRON WATERMAIN AND MORE THAN 5 FT TO ANY DUCTILE IRON WATERMAIN. City of Seattle SCALE 3/8"=1'-0" WATERMAIN SETBACK REQUIREMENT FOR C.I. LEAD JOINT & D.I. SLIP JOINT PIPE

25.	Hydrant	3 foot minimum cover over pipe and 4 foot level area (4 foot radius) from center of hydrant
26.	Gas	Minimum 3 foot cover
27.	Power Pole and Guy Wire	5 foot minimum separation is necessary from the outside of the pole to the Bioretention cell top of slope.
Street Improvements		
27.	Curb bulb-out with bioretention	See GSI Manual Detail
28.	Curb bulb-out radii at intersections	10 feet for the radius nearest to the travel lane and 20 feet for the radius closest to the right-of-way margin per Seattle ROW Improvements Manual.
29.	Intersection Improvements	SDOT has specified that: • Improvements within 15 foot of the intersection trigger full sidewalk and ADA curb ramp improvement/replacement through the intersection, including companion ramps. • If curb bulb-outs are proposed at an intersection, they are required to extend the entire 30 foot of non-parking area. • Two directional ramps are generally required at each return. Occasionally bisector ramps are allowed when it is impossible to place two directional ramps due to steep slopes areas, etc. When Pedestrian path is at grade no intersection work is required.
30.	Road centerline	For projects proposing full ROW reconstruction, the center line of the road (typically residential) may be shifted up to 7'. The shift shall be with the radius of 250' and the tangent for the curvature shall start 20' off the ROW line of the intersecting street. For projects not doing a full ROW reconstruction, maintain the existing centerline
31.	Pedestrian Access/Access Paths	See GSI Manual, under Section 8.3.5.

4 DESIGN APPROACH

4.1 Project Minimum Requirements

In addition to the requirements listed in the PIP Section 3.4.1, the following apply:

- The bioretention cell system should be sized to achieve 80% AAV treatment of the runoff from the entire contributing area. If, due to site constraints, the bioretention system cannot be sized to treat the runoff from the entire tributary area, bypassing runoff from the additional area beyond what the facility is sized for is preferred. If bypassing runoff from the additional area around the bioretention system is not feasible, then the system may receive runoff from the additional area as long as the total runoff to the facility does not exceed twice the area for which it was sized. If this criteria cannot be met, then consider the site infeasible.

- The NDS Partnering PIP requires recording the impervious area treated for each project in order to track and measure the program's achievements (Section 4.1). In reporting the area treated it shall be recorded as the area equivalent to the 80% AAV treatment sizing of the system.

4.2 Site Selection

See NDS Partnering PIP and Appendices D, E, F, & G

4.3 Discharge of Treated Water

For infiltrating bioretention cells, the project will infiltrate treated stormwater using shallow infiltration through the cell bottom. If an underdrain is used, it is anticipated that some of the water will infiltrate and some will enter the underdrain and be conveyed into the storm system. If a Drilled Drain/UIC is the final discharge point, the capacity of those facilities needs to infiltrate 100% of the runoff. The use of a Drilled Drain/UIC needs approval from SPU and shall be designed by the geotechnical engineer.

4.4 Conveyance of Overflow

Each bioretention cell will function in two ways, as a treatment facility and as a conveyance system. Up to 12", although 6" is more typical and should be considered given site context, above the cell bottom is the temporary ponding/treatment zone. The area above ponding is the conveyance section that carries flow downstream to an existing conveyance system.

Each cell is connected by the conveyance swale/section or underground pipe. When the driveway intercepts the conveyance swale, flow may be directed under the driveway via a culvert or via a depression where the road and driveway meet. If at the end of the block there is no available drainage connection point, such as an existing ditch or pipe, up to one short block length (approximately 300 lf) of new conveyance may be constructed to connect to an existing system downstream.

4.5 Planting

Per GSI planting list. Projects shall specify larger plants rather than small plugs so that the project looks more filled in right after construction instead of having to wait a full season for growth to occur.

4.6 Conflicts with existing ROW uses

4.6.1 Trees

Avoid the critical root zone of trees.

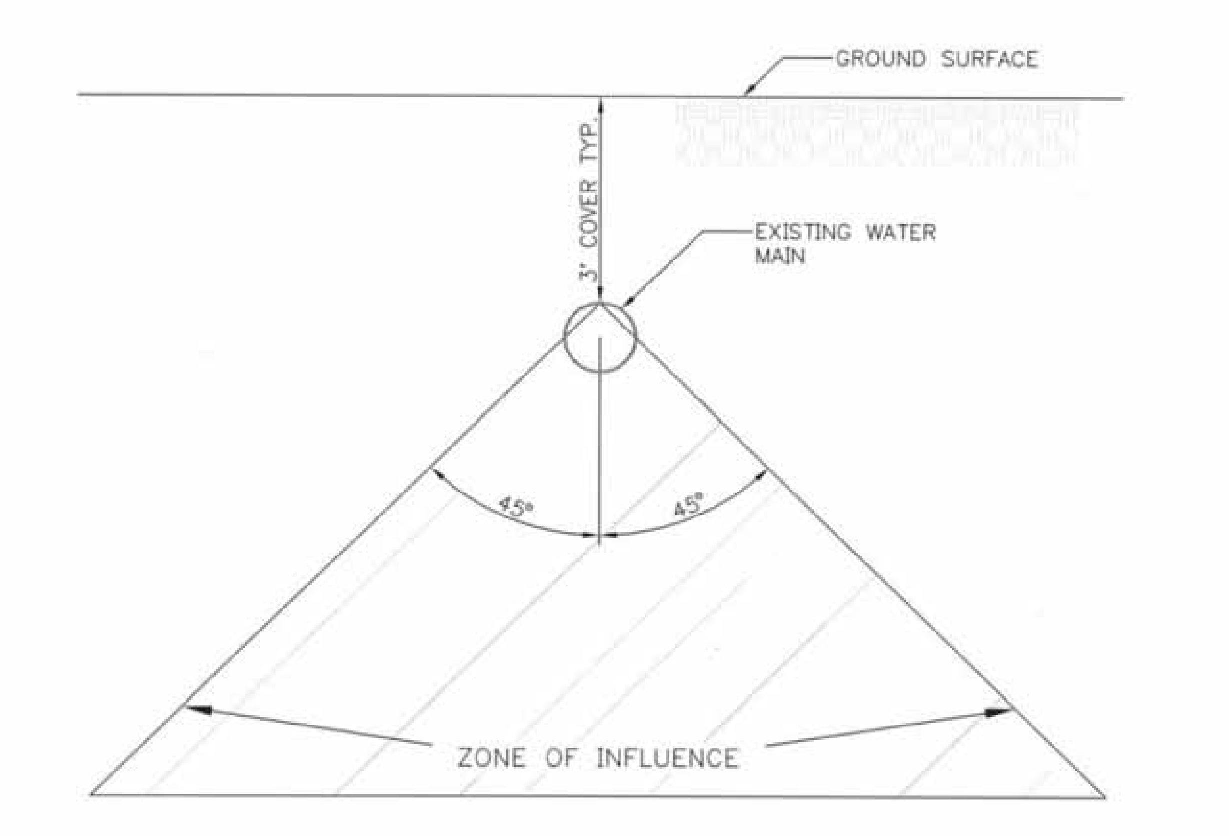
4.6.2 Utilities

Water Main

If work near the water main (Cast Iron pipe or Ductile Iron pipe) is anticipated, settlement monitoring or vibration monitoring of the water main may be required during construction.

Settlement Monitoring

Settlement Monitoring is required when trenching parallel to the water main and the adjacent trench depth intersects the 1:1 zone of influence of the water main. The zone of influence begins from the spring line of the water main.



Vibration Monitoring

Vibration Monitoring is required when construction work causes vibrations within 10’ of CIP WM. Monitoring can also be triggered if the site is within an Environmentally Critical Area. Construction work not allowed without protection plan in this area includes

- Concrete breaking
- Heavy equipment pounding on the pavement
- Compaction using vibratory rollers

Water Service

Avoid replacement of galvanized iron and plastic water services. These services would require full replacement to the water main and may incur significant roadway restoration. SPU Engineering can assist with identifying these services.

Fire Hydrant

Avoid replacement of fire hydrants. The hydrants would require full replacement to the water main and may incur significant roadway restoration.

Sanitary Sewer

Avoid placing infiltrating bioretention cells over side sewers due to the concern of flow being intercepted through joints or cracks on the side sewer.

Gas

Avoid replacement of gas mains and when reasonable, avoid replacement of gas services. Replacement of gas mains may incur significant roadway restoration. Replacement of gas services of a specific material could require significant work on private parcels.

Fiber Optics/Cable/Duct Banks

Avoid replacement of fiber optics or cable lines. These could incur significant costs and significant roadway restoration. Use Table 8-6 in GSI Manual Volume III for guidance.

4.7 Overall Design Considerations

Structures within cells

Whenever possible, located any structures such as cleanouts, maintenance access pipes, UICs, outside of the cells for maintenance access. Avoid placing in driveways or zones used for parking that could hinder access for SPU crews. Structures in the cells can look unsightly and present the appearance of a safety hazard. When they must be located in the cell, consider the color of the structure and how best to have it blend in with the surroundings.

Lids on structures

Specify lids on structures that are in the planting strip and not in the roadway with consideration of the maintenance and monitoring staff. Do not specify lids that cannot be lifted safely, consider both the size and weight of the lids. Consult with SPU Project Engineer to determine what would be most appropriate if COS Standard Plans do not apply.

Access to structures

Ensure staff and their vehicles can easily and safely access structures for maintenance or monitoring activities.

Aesthetics

Consider how the overall design will look to the neighborhood. Sometimes you must give on the engineering side of things to create a better overall design. Highlight elements of the design that might not fit in with the context of the street or neighborhood to discuss with team to evaluate tradeoffs between design and aesthetics.

Appendix D: Sample Data and Logic for Desktop Feasibility Analysis

- Sample Data and Logic to Determine Where NDS is Potentially Feasible

GSI Infiltration Facilities Suitability Analysis

Criteria for determination of areas not needing analysis for infiltration suitability:

- Areas designated as too steep for infiltration in the SPU Geotechnical Report for five basins (North Union Bay, Fremont/Wallingford, Interbay, Magnolia, Montlake) Note: for basins with data from the Geotechnical Report, the slope analyses discussed below were not conducted. Only the Geotechnical Report data was used in the AUI identification for steep slopes.

- Areas designated as too steep for infiltration in the SPU Geotechnical Report for five basins (North Union Bay, Fremont/Wallingford, Interbay, Magnolia, Montlake) Note: for basins with data from the Geotechnical Report, the slope analyses discussed below were not conducted. Only the Geotechnical Report data was used in the AUI identification for steep slopes.

- Areas designated as steep slope by SPU (“steepslp” shapefile) with a 100-ft uphill buffer. These areas are assumed to be minor steep slopes; therefore, a minimum buffer of 100-ft was used.

- Areas designated as steep slope by SPU (“steepslp” shapefile) with a 100-ft uphill buffer. These areas are assumed to be minor steep slopes; therefore, a minimum buffer of 100-ft was used.

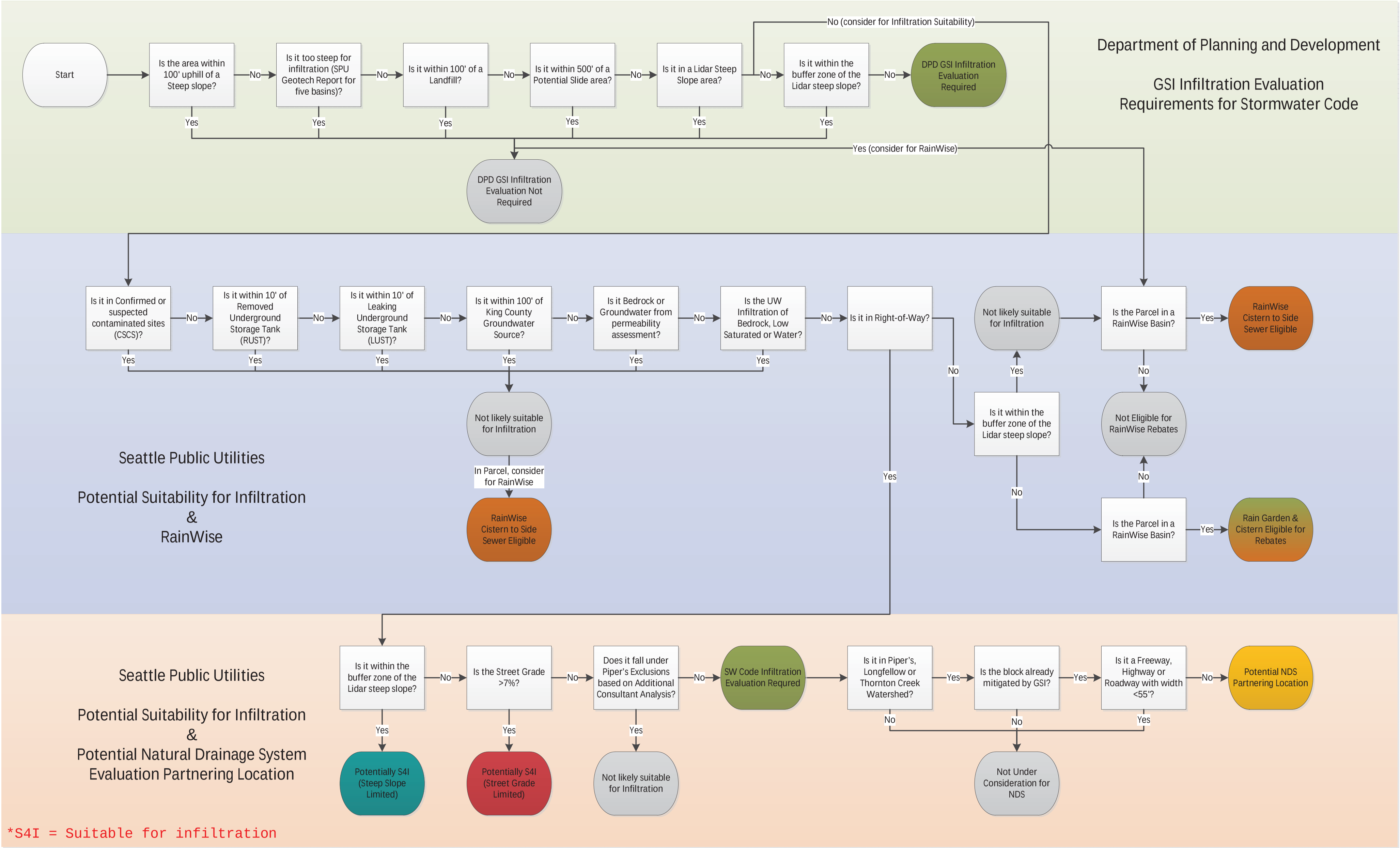
- Landfills (“landfill” shapefile)

- Areas within the Lidar Steep Slope Buffer (If within Parcel then AUI, if within ROW then labled “ROW Lidar Steep Slope Buffer”)

- Areas within the ROW where street grade >7% are labeled as “ROW Street Grade >7%”

Green Stormwater Infrastructure Suitability Analyses

May 21, 2015



*S4I = Suitable for infiltration

Appendix E: Sample Potentially Feasible Area Map

- Sample Pre-Screening map for Large Basin Study Area available by request from WTD
- Sample Potentially Feasible Area Map with initial site ratings

Thornton NDS Potential

North Section

- 🟪 Localized Flooding
- 🟦 Potential Path 1/2

Existing Explorations

- ● Infiltration favorable
- ● Infiltration moderately favorable
- ● Infiltration not favorable

Existing Groundwater Wells

- 🟩 Groundwater below 10.5 feet
- 🟨 Groundwater between 5.5 and 10.5 feet
- 🟥 Groundwater above 5.5 feet
- ● Spot Drainage Project Area

NDS Feasibility from Field Notes

- — High
- — Moderate
- — Low
- ⋯ None

Infiltration Potential

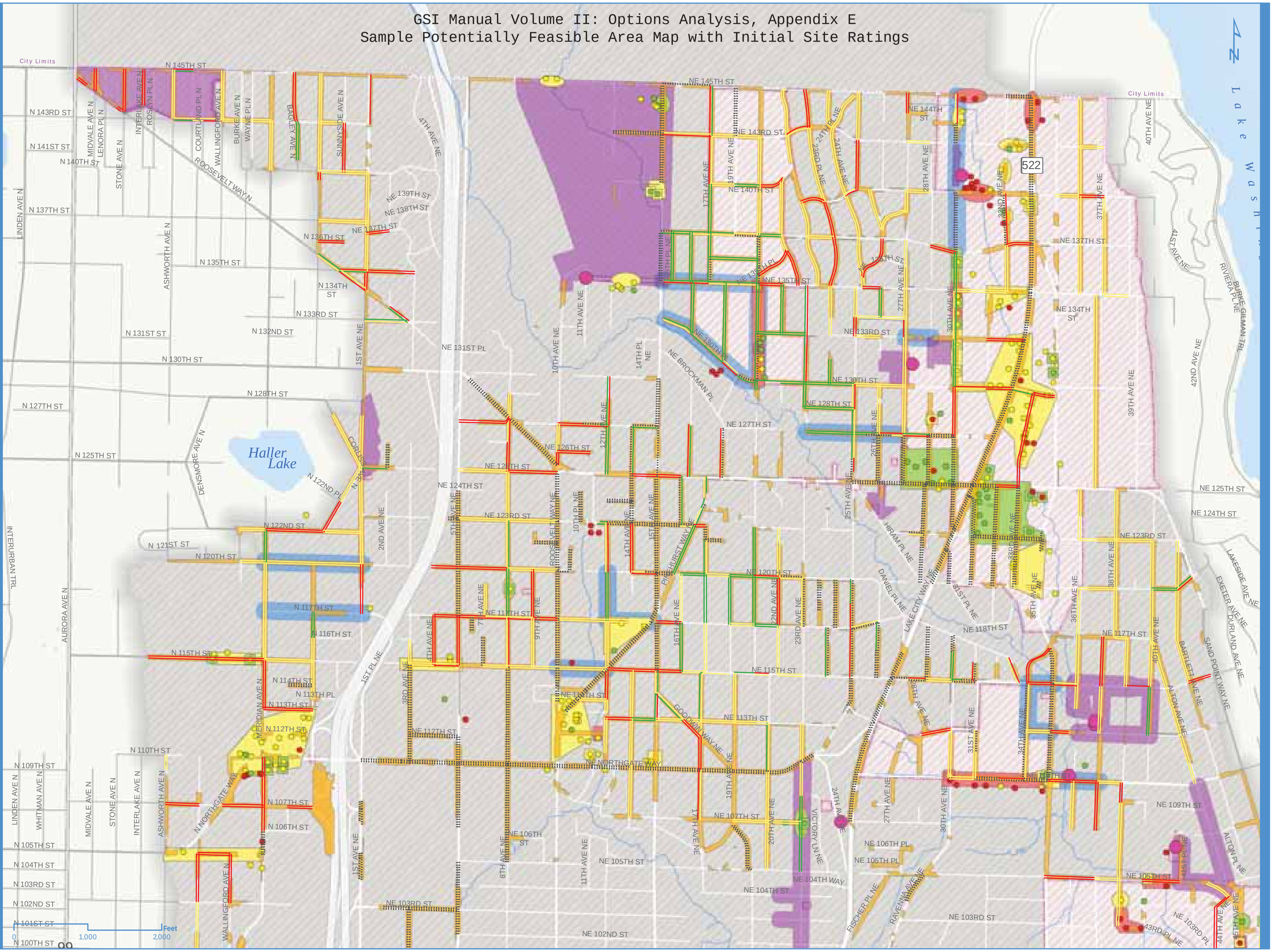
- 🟩 Infiltration favorable
- 🟨 Infiltration moderately favorable
- 🟥 Infiltration not favorable
- 🟧 NDS Partnering Streets
- ▢ Localized Flooding Priority Project Area
- — Urban Watercourses
- ▨ Thornton Creek Watershed

Seattle Public Utilities

Produced by DWW Environmental Science & Technology.

This map X:\WQ\GSI\NDSPartnering\Thornton\Thornton_Overview.mxd was produced on 1/27/2017.

GSI Manual Volume II: Options Analysis, Appendix E
Sample Potentially Feasible Area Map with Initial Site Ratings



Thornton NDS Potential

South Section

🟪 Localized Flooding

🟦 Potential Path 1/2

Existing Explorations

- ● Infiltration favorable
- ● Infiltration moderately favorable
- ● Infiltration not favorable

Existing Groundwater Wells

- 🟩 Groundwater below 10.5 feet
- 🟨 Groundwater between 5.5 and 10.5 feet
- 🟥 Groundwater above 5.5 feet

● Spot Drainage Project Area

NDS Feasibility from Field Notes

- — High
- — Moderate
- — Low
- ┈ None

Infiltration Potential

- 🟩 Infiltration favorable
- 🟨 Infiltration moderately favorable
- 🟥 Infiltration not favorable

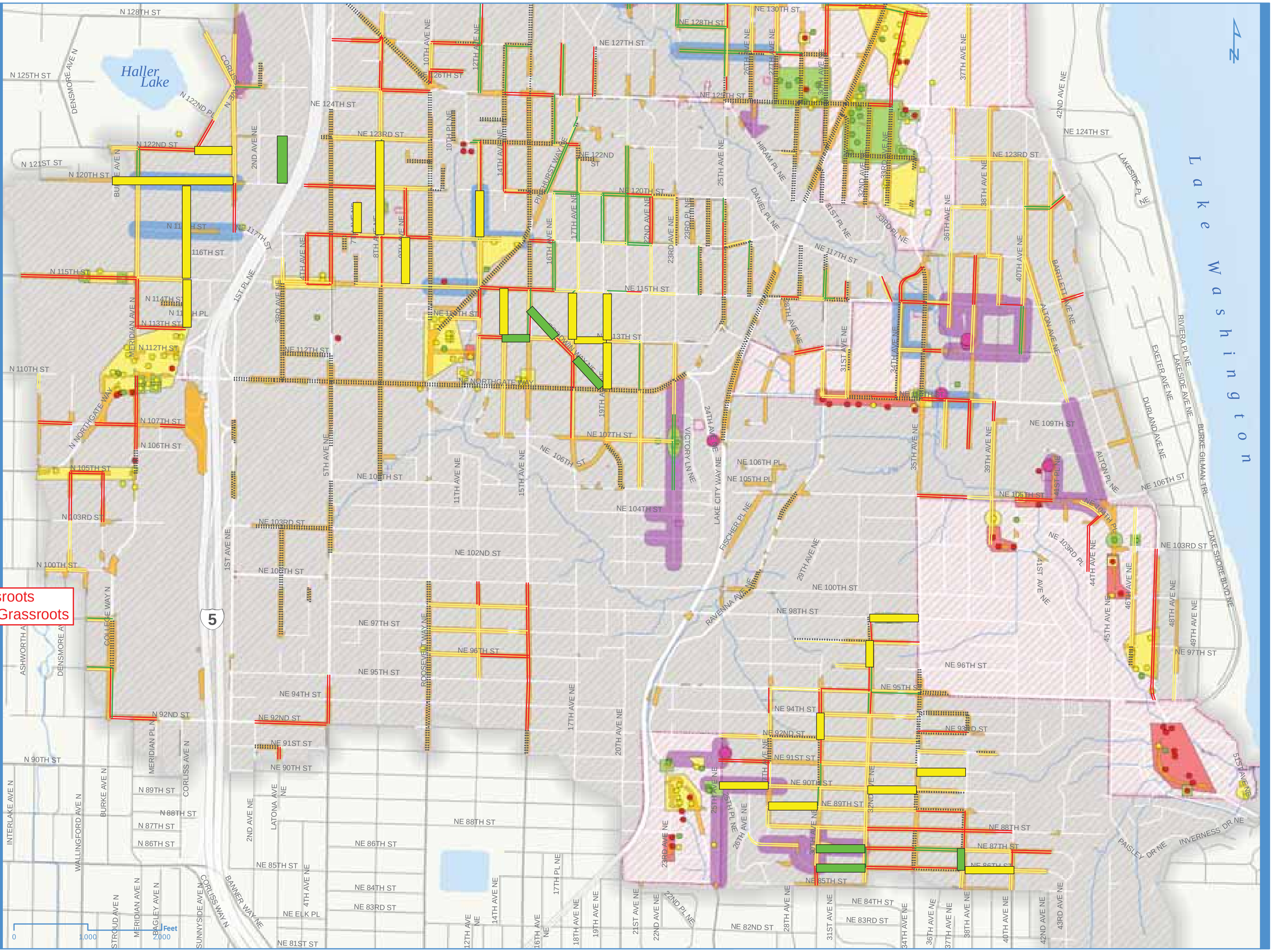
🟧 NDS Partnering Streets

▨ Localized Flooding Priority Project Area

— Urban Watercourses

▨ Thornton Creek Watershed

Green: High Priority for Grassroots
Yellow: Moderate Priority for Grassroots



Seattle Public Utilities

Produced by DWW Environmental Science & Technology.

This map X:\WQ\GSI\NDSPartnering\Thornton\Thornton_Overview.mxd was produced on 1/27/2017.

Appendix F: Sample Criteria Matrix for Prioritizing Sites

- Sample Initial Evaluation Criteria for Selecting NDS Sites post Windshield Survey Review, Excerpts from TM

TECHNICAL MEMORANDUM

NDS Partnering Longfellow Basin Options Analysis

Windshield Survey (Task 2.4)

PREPARED FOR:	April Mills Greg Stevens Luis Ramirez SPU
COPY TO:	Dustin Atchison, ch2m
PREPARED BY:	Kathryn Gwilym, PE, Collins Moore, EIT Justin Martin, PLA MIG | SvR
DATE:	July 14, 2017

This memorandum summarizes the process and field notes for the Windshield Survey for Seattle Public Utilities' (SPU) Longfellow Creek Options Analysis phase. Program goals include water quality treatment, storm water volume reduction, creek basin conveyance, peak flow control and climate resiliency.

1.0 Windshield Survey Project Area

The streets reviewed for the Windshield Survey and feasibility review included:

- SW Webster St. between 15th Ave SW and 16th Ave SW (WEB 16-15)
- SW Webster St. between 16th Ave SW and 17th Ave SW (WEB 16-17)
- 25th Ave SW between SW Barton St and SW Cambridge St (25-BART-CAM)
- 30th Ave SW between SW Barton St and SW Cambridge St (30-BART-CAM)
- 25th Ave SW between SW Hudson St and Puget Blvd SW (25-HUD-PUG)

2.0 Procedures

On July 7, 2017 MIG I SvR staff conducted site visits to review field conditions and opportunities for locating roadside bioretention facilities with graded side slopes in the public right of way (ROW). The facilities may either be shallow infiltration or have an underdrain connecting back to the public storm drain system to Longfellow Creek. We also understand there is a potential for these streets to have public sidewalks installed.

Base maps were prepared for the field visit using SPU's PERC maps. Gas mains were then added to the map using drawings obtained from Puget Sound Energy by SPU. We also reviewed SDCI's GIS maps http://web6.seattle.gov/dpd/maps/dpdgis.aspx for sensitive areas not included in the PERC map; the City's street classification, Greenway and transit maps; and SPU's Geotechnical Engineering's Infiltration Assessment Area Map June 2016.

During the site visits, we completed the Windshield Survey forms and marked up the base maps documenting conditions observed for each street. See Attachment 1 for a list of elements within and adjacent to the ROW that were evaluated for determining feasibility. We also made notes on the base maps identifying areas of opportunity where roadside bioretention may be feasible given the drainage patterns, ROW & adjacent area conditions.

Upon review of the available data and compilation of the field observations, we then determined each street's initial feasibility based on the Windshield Survey Instructions form, as described below:

- High = No or minimal limitations noted
- Moderate = Some challenges, likely possible to mitigate
- Low = No fatal flows but would be very challenging to site

3.0 Compiled Data

See the following attachments for compilation of the data gathered.

- Attachment 1: Summary of Windshield Survey field notes and feasibility review
- Attachment 2: Photos from Windshield Survey site visits
- Attachment 3: Base maps with field notes from Windshield Survey
- Attachment 4: Completed forms done in the field of the Windshield Survey for each Street

4.0 Results

The following is a summary of the feasibility results for the Windshield Survey:

Table 1: Feasibility Results of Windshield Survey

Street	Feasibility	Discussion
WEB:16-15	MODERATE	• North Side: Potential to intercept street runoff from east and west of 15th on the northern half of Webster. Would possibly need to shift existing sidewalk further north to have adequate space for NDS and to avoid existing water main. • South Side: Potential to take southern half of Webster (west of 15th). • Possibly shift walk on both sides of street for NDS space in planter given road is at 21' and for setback for 25' road/bulb
WEB: 16-17	LOW	• North side: Not enough tributary area to capture from Webster. High point about 100’ from 16th. • South side: Not enough tributary area to capture from Webster. High point about 100’ from 16th. • South side: May be able to intercept runoff for west side of 16th between Webster and Austin; however it would probably require a curb bulb/wall for daylighting flows; survey review of grades on Webster to determine if it can be done via graded side slopes given high point in Webster; and redo of recent intersection curb ramp improvements and working around power poles.
25: HUD-PUG	LOW	• West side: North end of Street (downstream end) has slopes over 7-8% • East side: Not enough available space at north/downstream end in planter due to driveways plus road longitudinal slope 7-8%. • West & East side midblock: Has NDS potential if shallow infiltration was feasible; however asphalt road is heavily degraded down to subgrade with potholes and rubble in gutter.
25-BART-CAM	Moderate	• West side: Ample space for NDS in planting strip at downstream end; however houses sit lower than street or have basements. Recommend hydrogeologists/geotech review if bioretention with underdrain but not lined would be feasible. • East Side: It is unknown if existing CB/inlet in 2425 driveway goes to sanitary sewer in 25th or storm main in Barton. Further review in rain needed to confirm where road transitions from crowned to thrown for siting NDS on east side for intercepting gutter flow before CB/inlet at 2425.
30-BART-CAM	HIGH	• West side: street trees and driveways in planting strip but road is thrown so NDS potential is on east side. • East side: Road appears to be thrown & drains to gutter on east side. NDS with underdrain potential in planting strip upstream of CB at Cambridge. Planter has some mature shrubs, small tree/multi-stem trees that would be impacted. • Neighbor indicated that several residents along block on west side have sump pumps.

ATTACHMENT 1

Longfellow Basin Options Analysis	Initial Feasibility of NDS Partnering
Windshield Survey (Task 2.4)	🟩 High (H) - No or minimal limitations noted
Field Visit: July 7, 2017 - JM/CM/KG	🟨 Moderate (M) - Some challenges, likely possible to mitigate
MIG|SvR #15077	🟥 Low (L) - No fatal flaws but would be very challenging to site

Description	**SW Webster St. from 16th Ave SW to 15th Ave SW**	**SW Webster St. from 16th Ave SW to 17th Ave SW**
ID/PAGE (#'S) ATTACHED	WEB-16-15	WEB-16-17
Street Category	Neighborhood Greenway	Neighborhood Greenway
Street Type	Crowned	Crowned
Road Slope (Approximate from level)	Between 5%-8% from 16th Ave to alley and under 5% east of the alley. Then increases to 8% esat of 15th	Under 3%
SurfaceType/Condition	Asphalt / Fair	Asphalt / Fair
Edge Type for Road	No curb with gravel shoulder with some planter	No curb with gravel shoulder with some planter
Sidewalk	5' width concrete both sides	5' width concrete both sides
Intersection sidewalk ramps	Yes at west end (16th), with truncated domes; none at east end (15th)	Yes at east end (16th), NEW; none at west end (17th)
Traffic Calming	One speed hump mid block, stop sign at 16th.	One speed hump mid block, stop sign at 16th.
Right of Way Width per Perc	60'	60'
Existing Road Width	21'	21'
Road Edge Side of Road: Material (~Width from road edge to Property line)	Mostly gravel, some grass planter (18' +/-). Existing planter road edge to walk (11 +/-)	Mostly gravel, some grass planter (18' +/-). Existing planter / gravel shoulder to walk (11 +/-) North Side - Raised vegetable garden at west end
Encroachments btwn road to ROW line	n/a	n/a
Driveways	Gravel driveways see field notes	Gravel driveways see field notes
Parking Use/ADA parking	Minimal mid day parking on gravel shoulder / parallel / no ADA parking designated zone observed	Minimal mid day / parallel / no ADA parking designated zones observed
Pedestrian Access	See field notes	See field notes
Drainage Collection Structures/Conveyance (based on perc map and windshield survey observations)	Appears to flow down edge of road to CB's at intersection of Webster and 15th. Recommend checking in rain event.	Road has a high point / grade break approximately 100' from 16th ave and half block drains to CB's east end of street. No CBs on west end. Recommend checking in rain event.
Seeps/ponding	Unable to check in dry July weather.	Neighbor said it ponds at east end of block, south side, due to curb ramp improvements. Recommend checking in rain event.
Existing Tributary Area (based on perc map and field observations)	See field notes for estimate of potential tributary area.	There is a high point midblock so doesn't appear much runoff flows to CB on Webster just west of 16th so area was not calculated.
Potential to intercept flow from side streets	From 15th: Not feasible to redirect due to topography. From Webster east of 15th: Moderate - May be able to intercept half of ROW for Webster east of 15th. See field notes/tributary area. From 16th to south: Low - West side of Webster is steep off 16th 8%+. If intercept flow upstream of CB at SE corner of 16th and Webster, then flow would need to be piped 170'+ to area with NDS potential along with redoing curb ramps.	From 16th: Low to Moderate - To intercept gutter flow south of webster from west side of 16th, would need to redo curb ramps at intersection and install curb bulb along south side of webster between High Point in road to 16th intersection. 17th: N/A
Utility mains in planters strip (based on perc map and PSE map)	North Side - 6" W from east to mid-block; OH crossing mid-block and going up alley South Side - OH down entire block, gas	South Side - OH down entire block, spliting to go up 17th, Gas on s.side
Trees > 6in dbh (Within ROW and/or canopy OH ROW)	Few trees along block, mainly on north side.	None
Sensitive Areas (from City GIS and perc map)	None according to Seattles GIS & perc map.	None according to Seattles GIS & perc map.
SPU Hydrogeo Geotechnical Info	No info on SPU June 2016 infiltration assesment area map	No info on SPU June 2016 infiltration assesment area map
Feasibility/NDS location	🟨 Moderate	🟥 Low
	-North Side - Potential to intercept street runoff east and west of 15th for northern half of ROW. Would need to possibly shift existing sidewalk further north to have adequate space for NDS and to avoid existing water main. -South Side - Potential to take southern half of webster west of 15th. -Possibly shift walk on both sides of street for NDS space in planter given road is at 21' and for setback for 25' road/bulb.	-Not enough tributary area to capture from Webster -S. Side: May be able to intercept from 16th Ave (west half) but require curb bulb on Webster and redo of intersection improvements.
Interactions with public during 7/7/17 site visit	n/a	Long talk with resident of 1611, she was opposed to drainage "ditches" in the block. Doesn't want to lose parking, concerns with mosquitos, recent curb ramp improvement at curb causing drainage issues.

Longfellow Basin Options Analysis	Initial Feasibility of NDS Partnering
Windshield Survey (Task 2.4)	🟩 High (H) - No or minimal limitations noted
Field Visit: July 7, 2017 - JM/CM/KG	🟧 Moderate (M) - Some challenges, likely possible to mitigate
MIG|SvR #15077	🟥 Low (L) - No fatal flaws but would be very challenging to site

Description	**25th Ave SW from Hudson to Puget Blvd**	**25th Ave SW from Barton to Cambridge St**
ID/PAGE (#'S) ATTACHED	25-HUD-PUG	25-BART-CAM
Street Category	Residential Access	Residential Access, greenway, non-arterial
Street Type	Crowned	Crowned
Road Slope (Approximate from level)	Between 3.5% and 8% longitudinal slope	Under 2.5% longitudinal slope
SurfaceType/Condition	Asphalt / Poor	Concrete / Fair
Edge Type for Road	Concrete curb and gutter	Concrete curb and gutter
Sidewalk	5' width concrete both sides w/o detectable warning	5' width concrete both sides
Intersection sidewalk ramps	All intersections contain ramps	All intersections contain ramps without detectable warning
Traffic Calming	Traffic circle at intersection of 25th Ave and Hudson St	Traffic circle at intersection of 25th Ave and Cambridge St
Right of Way Width per Perc	60'	60'
Existing Road Width	25'	25'
Road Edge **Side of Road: Material (~Width from road edge to Property line)**	Mostly grass planters with street trees. Planter width (walk to face of curb) - (10.5' +/-) West side midblock landscaped planter East side - Planter is mostly grass with street trees	Mostly grass planters with some concrete planters. Planter width (walk to face curb) 10.5' +/- West side at southern end - 1-2 lots with landscaped strip East side - Mostly grass
Encroachments btwn road to ROW line	n/a	n/a
Driveways	Concrete driveways per field notes	Concrete driveways per field notes
Parking Use/ADA parking	Parallel Parking, Medium to high on street parking mid Friday afternoon, no ADA parking designated zones observed	Parallel parking, medium level of parking during mid day site visit, no ADA parking designated zones observed
Pedestrian Access	See field notes	See field notes
Drainage Collection Structures/Conveyance (based on perc map and windshield survey observations)	Appears to flow down gutter to CB's at intersection of Hudson and 25th. No mid-block CB's	Appears to flow down gutter on both sides of street and into CBs at north end of block. Low end of block (near Barton), 25th changes from crowned to thrown to west side after CB inlet that is in 2425's driveway, approx. 100' from Barton. The CB on the east side at north end of block is not on City's map. Recommend SPU review CB's downstream connection to determine if it connects to 8" PSS in 25th or 24" PSD in Barton. In rain, will need to confirm CB on east side receives gutter flow.
Seeps/ponding	Asphalt throughout street had alligator cracking. Midblock there was significant pavement wear down to subgrade with pot holes. Neighbor mentioned some homes have had flooding/seepage under some houses. Unable to check for seeps/ponding in dry weather.	None observed, unable to check for seeps/ponding due to dry weather
Existing Tributary Area (based on perc map and field observations)	See field notes for estimate of potential tributary area.	See field notes for estimate of potential tributary area.
Potential to intercept flow from side streets	None. Adjacent x-street grades does not make it feasible to reroute runoff from side street at north and south end.	Barton: Not feasible due to x-slope of Barton directs flow to north side of Barton (east of 25th). Cambridge: Low - the planting strip is heavily landscaped along 9258 and 9252 frontages plus limited space due to driveways, making siting of NDS challenging to intercept flows from Cambridge east of 25th (small tributary area ~3800 sf (1/2 road).
Utility mains in planters strip (based on perc map and PSE map)	East side - 8" water main See field notes for gas	East side of road - 6" water main See field notes for gas
Trees > 6in dbh (Within ROW and/or canopy OH ROW)	Many street trees along block & adjacent	Few - see field notes
Sensitive Areas (from City GIS and perc map)	None according to Seattles GIS & perc map.	None according to Seattles GIS & perc map.
SPU Hydrogeo Geotechnical Info	No info on SPU June 2016 infiltration assesment area map	Infiltration not favorable/moderately favorable north of Barton on 25th.
Feasibility/NDS location	🟥 Low	🟧 Moderate
	-Downstream end of block slopes 7-8% or greater making it challenging for NDS -Mid-block has NDS potential if shallow infiltration was feasible; however road is heavily worn to subgrade with pot holes	-West side has ample space however houses sit lower than street at downstream end or have basements. -East Side - It is unknown if existing CB/inlet in 2425 driveway goes to sanitary sewer or storm. Also need to confirm where road transitions from crowned to thrown to confirm siting on east side is feasible.
Interactions with public during 7/7/17 site visit	5056 Resident supported drainage improvement, concerned about work next door, he said he contaced the city. 5044 said they support NDS but concerned about condition of road where pavement has degraded.	n/a

Seattle Public Utilities

MIG SvR ch2m

Longfellow Basin Options Analysis
Windshield Survey (Task 2.4)
Field Visit: July 7, 2017 - JM/CM/KG
MIG|SvR #15077

Initial Feasibility of NDS Partnering
🟩 High (H) - No or minimal limitations noted
🟧 Moderate (M) - Some challenges, likely possible to mitigate
🟥 Low (L) - No fatal flaws but would be very challenging to site

Description	**30th Ave SW from Barton to Cambridge St**	
ID/PAGE (#'S) ATTACHED	30-BART-CAM	
Street Category	Residential Access - greenway	
Street Type	Thrown to the east	
Road Slope (Approximate from level)	Between 1.5% and 4% longitudinal slope	
SurfaceType/Condition	Concrete / Fair except some patches	
Edge Type for Road	Concrete curb and gutter	
Sidewalk	5' width concrete both sides	
Intersection sidewalk ramps	All intersections contain ramps, only contain detectable warnings at Barton / 30th interesection	
Traffic Calming	Traffic signal at Barton intersection	
Right of Way Width per Perc	60'	
Existing Road Width	25'	
Road Edge **Side of Road: Material (~Width from road edge to Property line)**	Grass planters with many bushes and trees. Planter width (face curb to walk) (10.5' +/-), lots of mature trees in planting strip	
Encroachments btwn road to ROW line	n/a	
Driveways	Concrete driveways per field notes	
Parking Use/ADA parking	Significant traffic on street during AM site visit between Roxbury and Barton. Medium to dense parking along street during visit. Crossing signal at Barton and 30th.	
Pedestrian Access	See field notes	
Drainage Collection Structures/Conveyance (based on perc map and windshield survey observations)	Road is thrown to east so runoff appears to collect in gutter on east side and flow down gutter to CB just north of Cambridge. There are several locations on block where pavement has settled in the middle of the street which could affect sheet flow. Recommend checking sheet flow in rain.	
Seeps/ponding	One resident mentioned that several homes along block had sump pumps for their foundations. Several locations midblock where pavement has sunken and patched with asphalt in the middle of the road. Unable to check for seeps during dry weather.	
Existing Tributary Area (based on perc map and field observations)	See field notes for estimate of potential tributary area.	
Potential to intercept flow from side streets	Barton: Low - To intercept flows from Barton (south half west of 30th) and have it daylight into NDS on west side of 30th would be very challenging due the restoration for curb ramps, traffic crossing signal and conduit, removal of mature trees in planting strip (on 30th). Cambridge: None - due to adjacent street topography it is not feasible to intercept flow and redirect it onto 30th.	
Utility mains in planters strip (based on perc map and PSE map)	East side of road - 8" water main See field notes for gas	
Trees > 6in dbh (Within ROW and/or canopy OH ROW)	Many street trees along block & adjacent. Shrubs and small trees (3" tomultistem) in planting strip for NDS potential at S. end.	
Sensitive Areas (from City GIS and perc map)	None according to Seattles GIS & perc map.	
SPU Hydrogeo Geotechnical Info	No info on SPU June 2016 infiltration assesment area map	
Feasibility/NDS location	🟩 High	
	-Road is thrown and drains to east side. Potential NDS just upstream of CB at Cambridge. Planter in this area has some mature shrubs, multi-stem trees, young tree.	
Interactions with public during 7/7/17 site visit	Resident of 9225 says many houses use sump pump on block. Concerned that on-street parking would be taken away if Greenway came through. Heard that it might be a bike lane.	

Appendix G: Sample Site Reconnaissance Protocols, Forms, and Block-Scale Feasibility Maps

- Sample Survey Instructions/Field Notes for Conducting Site Reconnaissance
- Sample Instructions for Conducting Site Reconnaissance available by request from WTD
- Sample Block-Scale Feasibility Maps for documenting potential feasible area for GSI Along a block

Longfellow NDS Options Analysis Windshield Survey Instructions/Field Notes

Completed by: ___________ Date & Time of Field Visit: _____________ Has it rained w/n last 48 hours? _________

Take photos of observations. Start from the downstream end of the block, preferably. Mark field notes on basemap.

1. ID Give a unique ID for each block. For numbered Avenues, note with Street # and Northern Cross street (e.g. 18-T = 18th Avenue South of Thistle). For named Streets note Street Initials(s) and western cross street (e.g. T-18 = Thistle east of 18th Avenue SW.

ID # ________

2. Street, From & To Note street name and bounding blocks from north to south

Street: ____________________ Intersection to Intersection: ____

Type: Neighborhood, Arterial, transit, Greenway, Truck route,__ ____

3. Drainage Collection Structures

Confirm area drains to public storm drain that outfalls into Longfellow____________________________________

Review drainage flow path and where it collects in the street. CB's? Midblock CB's? Ditch? Culvert? Other?

____

Confirm location of CB's/Inlets/Ditches are consistent with perc map _______________________________________

Disconnected Downspouts ____

Point Discharges (such as concentrated sheet flow or curb drains daylighting? Etc) __________________________

4. Tributary area of the ROW

Review topo from perc map (upstream and downstream end of blocks) ___________________________________

Does it receive runoff from upstream blocks? ____

Does it receive runoff from an arterial that can possibly be intercepted?___________________________________

Do adjacent midblock alleys drain into ROW (via sheetflow across entire parcel block?) or do they direct flow onto another ROW? _____________________________

Sketch approximate tributary area to each side of the ROW. ____

5. Street Type

Street type: crowned or thrown (drainage infrastructure may support observations – ie. CBs on both sides vs one side of street). Note direction (dir) by the compass direction (or use level in field to determine) if the roadway is thrown. Sometimes used TF to signify street is thrown to that side and TO is thrown to the opposite side.

_____ Crowned ___ Thrown __Varies (Describe on map how it varies)

6. Road Slope

Typical Longitudinal road slope and Direction of Slope. Roughly gage slope as follows :

Flat (F) = 0-2% Moderate (M) = 2-5% Steep (S) = >5%

If varies then describe: ____

Grade Breaks in Road Slope (Low Point mid block? Or High point mid block?)______________________________

7. Roadway Width

Note the road width in feet. Min. of 20 feet is required for thru traffic, therefore 25-foot minimum for installing 5-foot curb bulbs. Check if it varies. Typical Road Width: ___________ or Width Varies? _______________

8. Surface

Pavement type (concrete vs. asphalt) _____Concrete Road ____Asphalt Road

Notes about condition if applicable (poor, fair?) ____

9. Edge Curb and Gutter, ditch or informal (e.g. no defined ditch or curb).

Both sides the same? Yes / No
If same, circle all that applies: C&G Ditch No Curb Gravel Shoulder Other: ____________________

If not the same describe each side:
Side of Street: ________ C&G Ditch No Curb Gravel shoulder? Other: ________________________
Side of Street: ________ C&G Ditch No Curb Gravel shoulder? Other: ________________________

10. Sidewalks & Curb ramps
Sidewalks on both sides, one side or none? ____
Sidewalk width and material type ____
Curb ramps mark on plans number (look at all 4 corners) and if detectable warning plates present____________

11. Traffic Circle and Traffic Calming
Traffic circle? Note which end(s) of the block ____
Curb bulbs, signage for traffic calming, speed humps____

12. Planter Width (for streets with curb)
Typical planter width, note on drawing approximate size in feet on each side
Side of Street: ________ Planter Width: _______ If width varies, Describe: _______________
Side of Street: ________ Planter Width: _______ If width varies, Describe: _______________

13. Adjacent topo
General topography of R/W vs. adjacent parcels (above/below/steep grades/rockeries, walls)
Review for closed depressions and basements (if visible from street)
Side of Street: ________ Describe: ____
Side of Street: ________ Describe: ____

14. Improvements and encroachments within the right of way
Fences, large shrubs, vegetable gardens, sheds, walls, rockeries, structures
Side of Street: ________ Describe: ____
Side of Street: ________ Describe: ____

15. Driveways & Vehicular Access
Review Location of driveways (paved and unpaved) from Aerial photo and confirm in field and mark on plans
Note extra wide or unused____

16. Pedestrian Access in planting strip and to main entrance of property
Identify location of private parcel access paths, gates, ramps and mark on plans ______________________________

17. Parking
Note high use (e.g. >30% occupied), ____
Type of Parking: Perpendicular or informal parking? and presence of ADA parking, Designated Loading Zones, Bus Stop Zones ____

18. Seeps & Ponding
Note presence of seeps or other evidence of shallow groundwater or poor infiltration such as ponding in the area.

____

19. Parcels

Are parcels below street? ____

Check aerial photo for building location with field observations - similar? ______________________

Utilities

Note on plans

When structures are off from perc map location (e.g. on same side of street, w/n 5'+/- as shown on perc?)___

Hydrants consistent with Perc map? ____

Utility poles consistent with Perc Map? ____

Is it OH or UG (for power/cable/telephone/lighting)? ___________________________________

If perc shows PP but not OH, review in field if there is OH lines & mark on plans _________________

Overhead consistent with perc map? (is OH distribution or service?) __________________________

Utility locations (gas and water mains – based on valve locations, water meter boxes)_____________

UG Franchise/Power Vaults? Electrical Cabinets? ______________________________________

Trees

Trees per block: a lot/a few; ____

Mark on plans large trees (>6 in. diam); ____

At downstream end of block and midblock catch basin note general tree locations within both the r/w and on private property, approximate dbh, canopy and type (conifer or deciduous). _________________

If curbless street, review upstream end tree canopy in ROW for future conveyance improvements_______

Initial Feasibility

Note initial assessment of feasibility.

High: no or minimal limitations noted
Moderate: Some challenges noted but likely possible to mitigate through design
Low: No fatal flaws but would be very challenging to site
None: Fatal Flaws noted

X-Street Potential if it is a designated GREENWAY??

Is there an opportunity to install bioretention on the cross street at the intersection to provide traffic calming and entrance to the block? Note which end of the block there is potential.

____

____

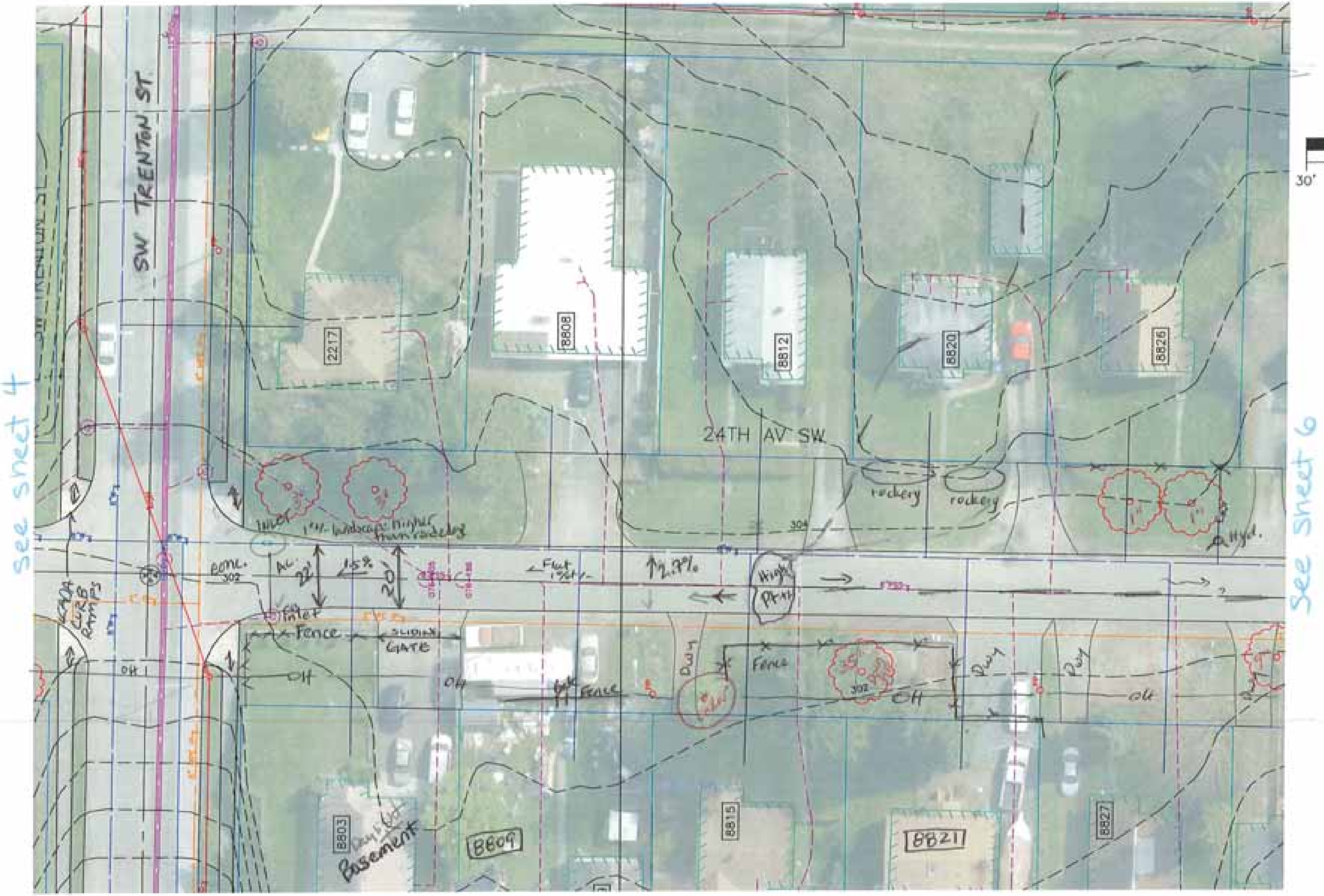
Is there a potential to intercept runoff from adjacent cross streets and direct it to bioretention?

Notes

Use the notes area at the bottom of the page to note additional observations/abnormalities that impact feasibility on the block. In the table note which number applies to that block.

Volume II - Options Analysis Appendix

Sample Windshield Survey Field Notes and documentation



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Windshield Survey
11/3/2016

PLEASE CALL 811
3 Working Days
BEFORE YOU DIG

N

30' 15' 0 30' 60

Scale In Feet

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LONGFELLOW
NDS OPTIONS ANALYSIS
WINDSHIELD SURVEY
11/3/2016

PLEASE CALL 811
3 Working Days
BEFORE YOU DIG

6

Figure Number 8. 24th Ave SW between SW Trenton to Henderson
Looking north on west side of 24th toward Trenton – encroachment in ROW house with basement

Figure Number 9. 24th Ave SW between SW Trenton St and SW Henderson St
Looking North from SW Henderson ST - possible Bioretention Area Eastside (Photo Taken November 14, 2016)

Figure Number 10. 24th Ave SW between SW Trenton St and SW Henderson St

Looking west at 8845 – Lower properties with basements (Photo Taken November 14, 2016)

Figure Number 11. 24th Ave SW between SW Trenton St and SW Henderson St

Looking west on Henderson at 22nd Ave SW -Drainage Patterns (Photo Taken November 5, 2016)

Figure Number 12. 24th Ave SW between SW Trenton St and SW Henderson St

Looking north on 22nd at Henderson Intersection– Drainage Patterns (Photo Taken November 5, 2016)

Figure Number 13. 24th Ave SW between SW Trenton St and SW Henderson St

Looking west on SW Henderson – Drainage Patterns (Photo taken November 14, 2016)

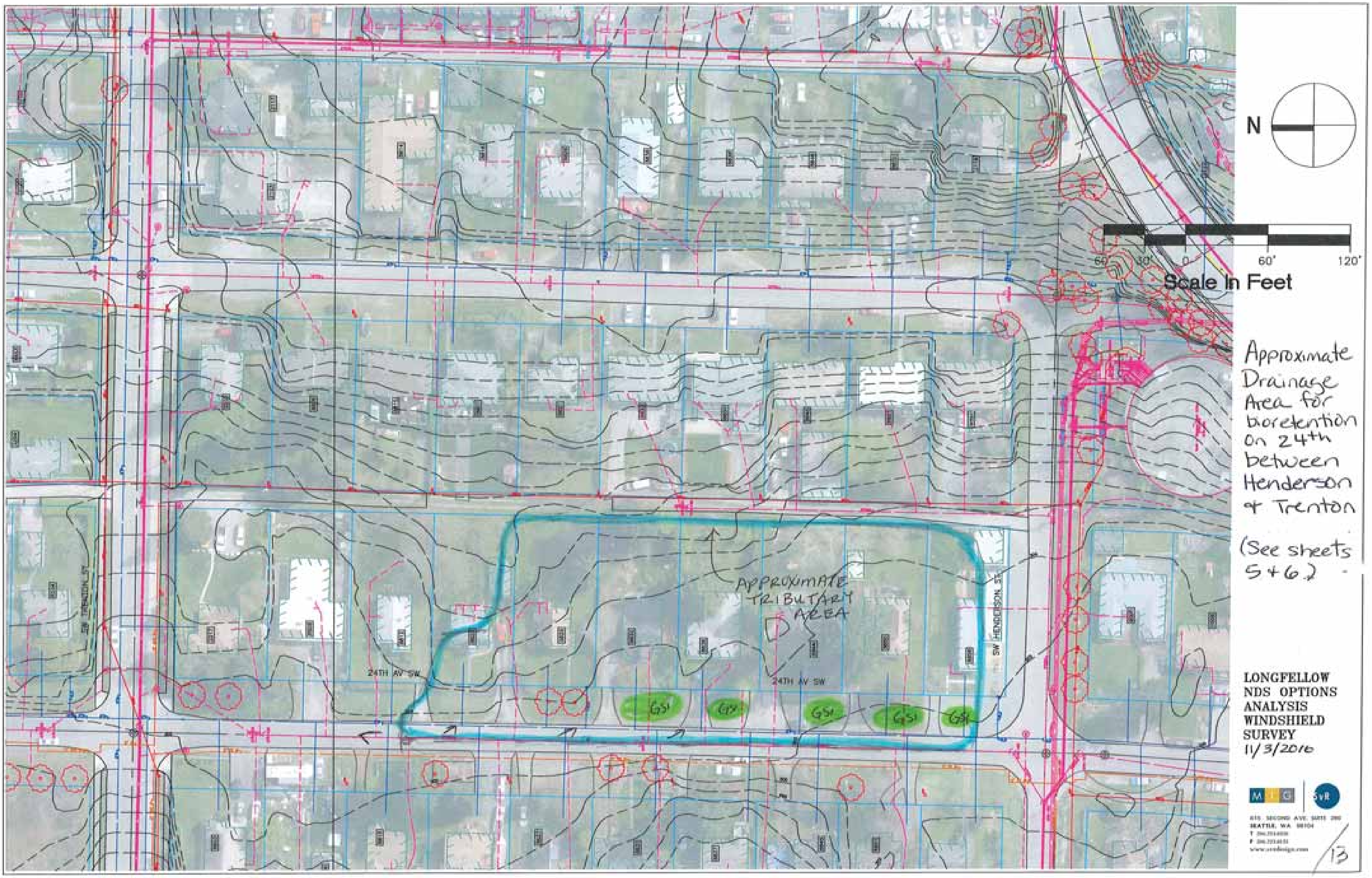
Figure Number 14. 24th Ave SW between SW Henderson St and SW Barton St
Looking south from SW Henderson – Potential Bioretention Location and catch basin

Figure Number 15. 24th Ave SW between SW Henderson St and SW Barton St
Looking south from SW Henderson – Low Point (Photo taken November 14, 2016)

Longfellow Basin Options Analysis
Windshield Survey (Task 2.4)
Field Visit: Nov. 3, 2016 - JAL/KG
MIG|SvR #15077

Initial Feasibility of NDS Partnering
🟩 High (H) - No or minimal limitations noted
🟨 Moderate (M) - Some challenges, likely possible to mitigate
🟥 Low (L) - No fatal flaws but would be very challenging to site

Description	**24TH AVE SW: SW TRENTON ST TO SW HENDERSON ST**	
ID/PAGE (#'S) ATTACHED	24TH TREN-HEN (5-6)	
Street Category	Neighborhood	
Street Type	Crowned	
Road Slope	0-2%; HP in road ~ Frontage at House #8812	
SurfaceType/Condition	Asphalt/fair	
Edge Type for Road	No curb	
Sidewalk	None	
Intersection sidewalk ramps	North (Trenton) - ramps w/DW in E-W direction only South (Henderson) - no ramps	
Traffic Calming	None	
Right of Way Width per Perc	80'	
Existing Road Width	Varies 17'-22'	
Road Edge Side of Road: Material (~Width from road edge to Property line)	East: Gravel-Grass (28' +/-) West: Gravel-Grass (32' +/-)	
Adjcent Grade/Encroachments between road edge to property line	East: flat/minimal West: level then drops at property/ Significant north end and middle	
Driveways	1 per property mostly gravel, both sides of street	
Parking Use/ADA parking	Minimal mid day / parallel / No ADA parking observed	
Pedestrian Access	mostly use driveways, some have gates and stairs.	
Drainage Collection Structures/Conveyance (based on perc map and windshield survey observations)	North of HP: Inlet & CB on south side of Trenton drains to 12" PSD in Trenton, which goes to Longfellow South of HP: Sheetflows to Henderson (intermittent ponding on each side of street), heads west on Henderson to CB at Henderson & 25th Ave SW. There is a 24" PSD on the south side of Henderson (from 22nd to 26th) connected to 72" PSD in 25th Ave SW.	
Seeps/ponding	Ponding observed along road edge and to east of road edge along frontages of 8832, 8838, 8844, 8850, 8856. Seeps from east of 24th on Henderson observed with ponding observed at SE corner of 24th & Henderson. Ponding also observed along road edge at 8857 and at NW corner of 24th & Henderson	
Existing Tributary Area (based on perc map and field observations)	See sheet 13. Approximately consists of lots 8820, 8826, 8832, 8844 8850 and 8856 and the associated eastern side of the right of way. Total Contributing area ~ 62,600 sf, which includes ~420 LF of road/half of ROW; ~9,500 sf of ROW impervious area (driveways & half road); parcel area 45,700sf.	
Utility mains in planters strip (based on perc map and PSE map)	West side - 2" Gas 5' from edge pvmt. West side - OH - 24' from edge pvmt. East side - 8" W at edge pvmt	
Trees > 6in dbh (Within ROW and/or canopy OH ROW)	Some - can work around	
Sensitive Areas (from City GIS and perc map)		
SPU Hydrogeologic Geotechnical Info	Groundwater - No Information Available Infiltration Potential - moderately favorable southern half and north corner	
Feasibility/location	Moderate overall High > East side south end managable tributary area with enough feasible area. Impacts some parking and access. Low> West side north end encroachments into ROW, mature trees, parcels with basements (ROW tributary area is low < 150LF) Low> West side south end some have first floors and/or basements below road grade. Would require walls and lining.	
Intern Feasibility 8/11/2016	*High*	
Intern Comments 8/11/2016	*ROW on E side is open and wide enough for GSI; more obstacles on W side of street*	



Approximate
Drainage
Area for
bioretention
on 24th
between
Henderson
& Trenton

(See sheets
5+6.)

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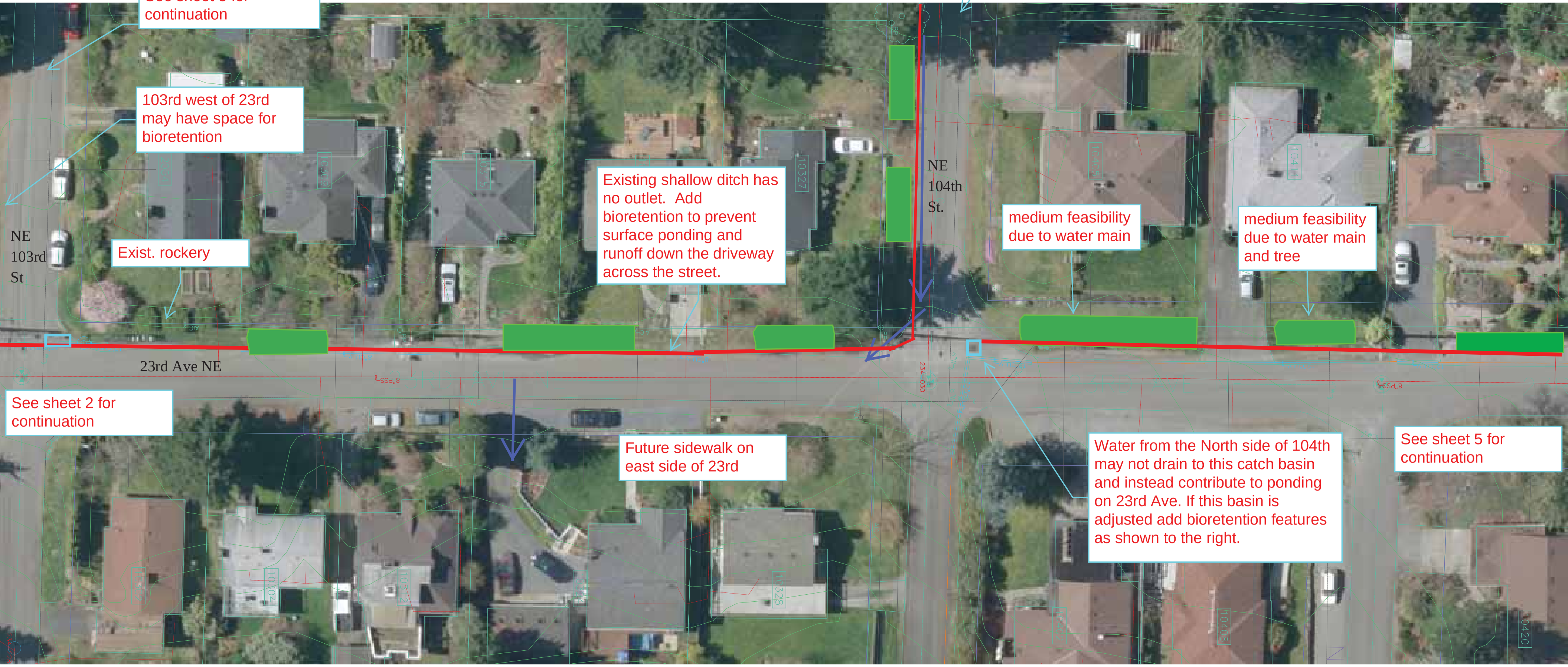
13

GSI Manual Volume II: Options Analysis, Appendix G
Sample Block-Scale Feasibility Maps for documenting potential feasible area for GSI along a block

Thornton Localized Flooding
Task 1.5, Concept Development, CH2M
Site 113, 10324 23rd Ave NE
Sheet 1 of 5



See sheet 3 for continuation

103rd west of 23rd may have space for bioretention

Exist. rockery

Existing shallow ditch has no outlet. Add bioretention to prevent surface ponding and runoff down the driveway across the street.

See sheet 4 for continuation

medium feasibility due to water main

medium feasibility due to water main and tree

See sheet 2 for continuation

Future sidewalk on east side of 23rd

Water from the North side of 104th may not drain to this catch basin and instead contribute to ponding on 23rd Ave. If this basin is adjusted add bioretention features as shown to the right.

See sheet 5 for continuation

Existing wedge curb/berm and driveway catch basin appear to have been constructed to address runoff from NE 104th

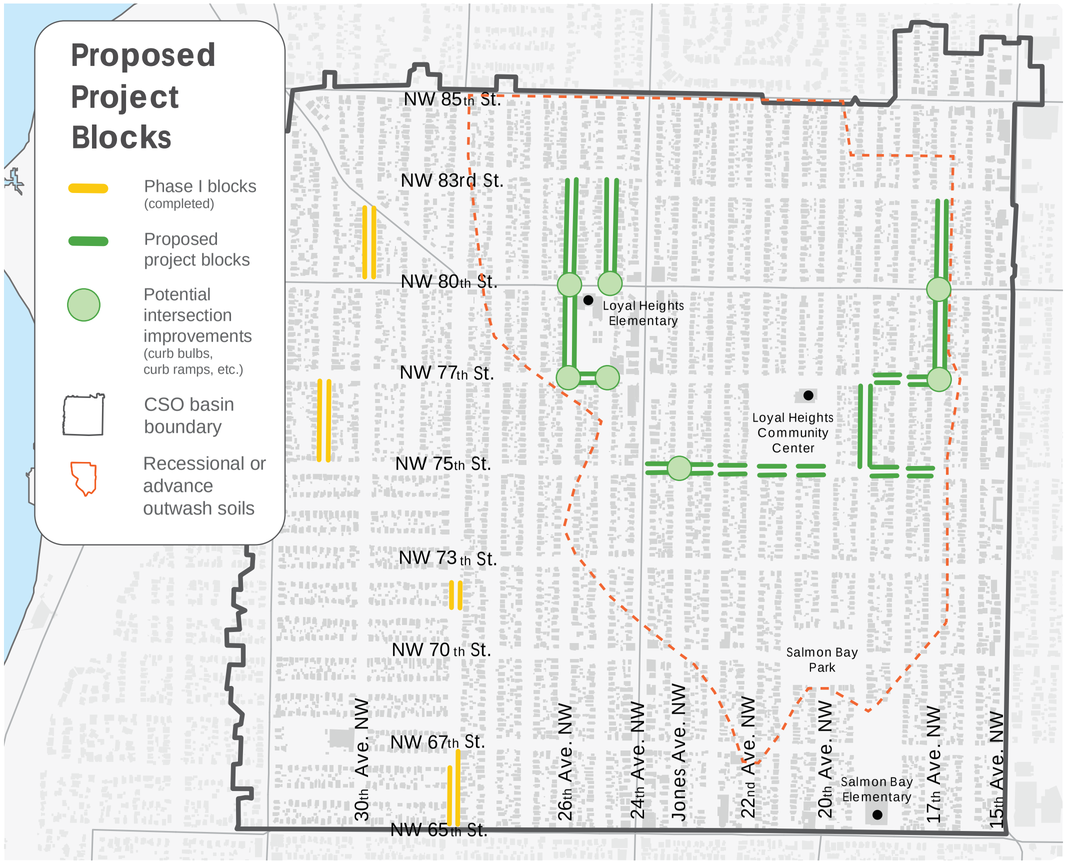
Note: Additional downstream conveyance analysis is recommended prior to design. Check for steep slopes or other infeasiblity criteria. Also complete private utility locates.

Appendix H: Site Selection Map

- Sample Graphic of Potential Blocks selected for Concept Development to include in technical memorandum for OA

GSI Manual Volume II: Options Analysis, Appendix H

Sample graphic of Potential Blocks selected for concept development to include in technical memorandum for OA



Appendix I: Sample Risk Registers

- Sample Project Risk Analysis for Large Basin Analysis available by request from WTD

Appendix J: Sample Criteria Scorecard for Option Selection

- Sample of applying DWW Ranking criteria to street concept for GSI retrofit
- Sample Alternative Scorecard Supporting metrics for Large Basin Analysis available by request from WTD
- Sample Alternative Scorecard Results for Large Basin Analysis available by request from WTD

Drainage and Wastewater Ranking Criteria

Draft: December 7, 2017

A and B Street SW - SAMPLE

Guide evaluation of drainage and wastewater system <u>problems and partnering</u> opportunities

SEATTLE

http://seattlecitygis.maps.arcgis.com/apps/webappviewer/index.html?id=a9c7058ffc15451eb4aa0a0b7803826c

DWW Ranking Criteria integrated with NDS Partnering site selection criteria

	Criteria Name	**Guiding Questions**		**Data Sources (see WebMap)**	**Rating Scale** **High (1)**	**Moderate High (0.8)**	**Moderate (0.5) or 0.6 where specified**	**Moderate Low (0.4)**	**Low (0.25)**	**No points**	Weights	Raw Score	Weighted Points	Scoring Notes
PUBLIC HEALTH, SAFETY AND ENVIRONMENTAL IMPACTS														
Location of Impacts	**Polluted discharges to receiving water bodies** (environmental)	Is the problem related to <u>polluted discharges</u> to a water body? Will your solution reduce or eliminate the problem? If not, 0 points.	Wastewater	Location of combined sewer outfalls	Wastewater discharge to any creek (e.g., Longfellow Creek)		Wastewater discharge to Lake Washington or Lake Union		Wastewater discharge to Duwamish River or Puget Sound	Potential solution does not address the water quality issue.	14%		0	
			Drainage	Receiving water body map	Stormwater discharge to highly impacted receiving water (Duwamish Waterway)		Stormwater discharge to moderately impacted receiving water (Lake Washington, Puget Sound/Elliott Bay, Ship Canal/Lake Union, Thornton Creek, Longfellow Creek, or Piper's Creek)		Stormwater discharge to water bodies not listed in High or Moderate ratings.			0.5	0.07	
	High flows to creeks and wetlands (environmental)	Is the problem related to <u>flows</u> impacting creek or wetland habitat conditions? Will your solution reduce or eliminate the problem? If not, 0 points.	Drainage	Description of flow to creek/wetland (flashiness metric is pending)	Stormwater flows to wetlands or salmon-bearing creeks (Thornton Creek, Longfellow Creek, Taylor Creek, Fauntleroy Creek or Piper's Creek).		Stormwater flows to wetlands or (non) salmon-bearing creeks.			No flow impact of concern.	8%	1	0.08	
	Discharges to streets or properties (public health and safety)	Is the problem related to a direct impact to public mobility, health and safety? (*Location of impact, not scale of impact*) Will your solution reduce or eliminate the problem? If not, 0 points.	Wastewater	Maximo, known problems planning spreadsheets, model results based on location of impact	Sewage in finished basement or 1st floor interior spaces OR Sewage overflow in street		Sewer backup into non-living private property interiors (e.g., crawlspace, garage, unfinished basement)			No flooding or sewer impact to public health and safety.	7%		0	
			Drainage	Maximo, known problems planning spreadsheets, fact sheets with photo documentation, model results based on location of impact	Flooding of interior living spaces		Flooding into non-living private property interiors (e.g., crawlspace, garage, unfinished basement) OR Flooding in street		Flooding into yards or sidewalks from public right of way			0.5	0.035	
	Severity of Impacts **(if unsure/risk of low infiltration reduce by 0.1)**	How <u>severe</u> is the public health, safety, or environmental impact of the problem?	Wastewater	Maximo, known problems planning spreadsheets, model results based on severity of public health and safety impact	Hazards or damages from backups occurring in **<u>multiple</u>** homes, businesses or geographic locations (or affecting many individuals). (public health and safety impact)		Hazards or damages from backups occurring in **<u>one</u>** home, business or geographic location			No flooding, sewer, or water quality impacts of concern.	8%		0	
			Wastewater	Combined sewer overflow map with volumes (environmental impact)	2 MG or higher average annual overflow or greater into water body		0.5 to 2 MG average annual overflow into water body		.03 to 0.5 MG average annual overflow into water body				0	
			Drainage	Maximo, known problems planning spreadsheets, fact sheets with photo documentation, model results based on severity of impact	Hazards or damages from interior flooding occurring in **<u>multiple</u>** homes, businesses or geographic locations (or affecting many individuals). OR Closure/blockage of a major arterial or route to a critical facility such as a hospital. (public health and safety) OR Road safety risk related to swiftly flowing stormwater or high ponding depth (public health and safety)		Hazards or damages from interior flooding occurring in **<u>one</u>** home, business or geographic location OR Blocked access to residential, business or public property OR Street flooding that greatly affects the mobility and health of pedestrians or vehicles		Shallow ponding that limits access to homes, businesses, or otherwise impedes pedestrians or vehicles OR Undermining of structures (e.g., retaining walls) on private property				0	Previous flooding in large storm caused multiple backups but not clear if problem is fixed.
			Drainage	GIS analysis results for amount of impervious surfaces in problem area for pollutant discharges, and contributing area plus wetland locations for flows + preliminary geotech data for infiltration risk and potential	*Pollutant generating impervious surface equal to or greater than 10 acres* *OR High flows to creeks/wetlands from 50 acre areas and greater (environment)* *OR >10 acres pollution generating impervious surface mitigated + allows volume reduction*	*>10 acres pollution generating impervious surface mitigated without volume reduction*	*Pollutant generating impervious surface 2-5 acres* *OR High flows to creeks/wetlands from 20-50 acre areas* *OR 2-10 acres pollution generating impervious surface mitigated + volume reduction (0.6)*	*2-10 acres pollution generating impervious surface mitigated without volume reduction*	*Pollutant generating impervious surface 0.5-2 acres* *OR High flows to creeks/wetlands from 5-20 acre areas*			0.4	0.032	PGIS = 2 acres. Some volume reduction may be possible.

Drainage and Wastewater Ranking Criteria

Draft: December 7, 2017

A and B Street SW - SAMPLE

Guide evaluation of drainage and wastewater system problems and partnering opportunities

SEATTLE

http://seattlecitygis.maps.arcgis.com/apps/webappviewer/index.html?id=a9c7058ffc15451eb4aa0a0b7803826c

DWW Ranking Criteria integrated with NDS Partnering site selection criteria

Criteria Name	Guiding Questions		Data Sources (see WebMap)	Rating Scale High (1)	Moderate High (0.8)	Moderate (0.5) or 0.6 where specified	Moderate Low (0.4)	Low (0.25)	No points	Weights	Raw Score	Weighted Points	Scoring Notes
Frequency of Impacts	How frequently does the problem impact public health and safety or the environment?	Wastewater	Description of frequency of combined sewer overflows per outfall	More than one combined sewer overflow per outfall per year (on a 20-year moving average)					No flooding, sewer, or water quality impacts of concern.	7%		0	
			Maximo, known problems planning spreadsheets, model results based on frequency of impact	Sewer hazards or damages occur at least annually		Sewer hazards or damages occur every 2 to 5 years		Sewer hazards or damages occur every 5 years or more				0	
		Drainage	Maximo, known problems planning spreadsheets, model results based on frequency of impact	Flooding hazards or damages occur at least annually		Flooding hazards or damages occur every 2 to 5 years		Flooding hazards or damages occur every 5 years or more				0	
			Confirmation of impacts during storms	Environmental impacts occur every time it rains							1	0.07	
SYSTEM RELIABILITY/RISK													
Criticality	Is the problem related to a critical part of the system that has a high consequence if it fails?	r	Pipe Criticality Map	Wastewater Pipe Criticality Score of 15 or higher (no scores for lower)					Does not support a critical part of the system	13%		0	
			Pump Station and Force Main Criticality spreadsheet	Score above 25		Score between 20 and 25		Score between 14 and 20				0	
		Drainage	Drainage mainline data (ideally one criticality map with scores)	Drainage Pipes greater than 36"		Drainage Pipes between 24"-36		Drainage Pipes between 12-24"				0	
			Building map overlayed with drainage lines	Drainage system servicing hospitals and schools OR Pipes under high density human occupied buildings or bridges		Drainage system servicing large daycares, nursing homes, retirement facilities, medical/dental facilities						0	
			Transportation corridor map overlayed with drainage lines	Drainage Pipes greater than 8" under regional transportation corridors (I-5, I-90, SR-99, SR-520).		Drainage Pipes greater than 8" under major transportation corridors (SR-509, SR-518, SR-522, or within 25' of heavy railroads.		Drainage pipes greater than 8" under light rails, street cars, under minor bridges or major arterial roads with 12" pipes or greater				0	
			Calculation of # of acres of total flow that is not being conveyed by inadequate or missing infrastructure	More than 50 acres flow to an area with inadequate or non-existing infrastructure		Between 30 and 50 acres flow to an area with inadequate or non-existing infrastructure		Between 15 and 30 acres flow to an area with inadequate or non-existing infrastructure			0	0.00	Parcel + ROW = 8.5 acres
			Environmentally Critical Areas Map: Landslide Prone	Drainage Pipes in known landslide areas		Drainage Pipes in potential landslide areas						0	
			Creek Culvert Prioritization matrix	Consequence of failure score of 3 (affects arterials, utilities or private property)		Consequence of failure score of 2 (blocking access to houses (and no drive around))		Consequence of failure score of 1 (affects access to houses with drive around))				0	
Condition	Is the problem related to a part of the system that has a high likelihood of failing due to its structural condition?	Wastewater	Planner Risk Score of CCTV'd assets	Planner risk score of over 81		Planner risk score of 61-80			Does not support a critical part of the system or have risk related to condition	13%			
			Pump Station and Force Main Criticality spreadsheet	Force main score, pump station high score for condition score		Force main score, pump station moderate score for condition		Force main score, pump station low score for condition					
		Drainage	Planner Risk Score of CCTV'd assets	Planner risk score of over 81		Planner risk score of 61-80							
			Creek Culvert Prioritization matrix	Creek culvert that is structurally unsound with a moderate-high risk of failure (likelihood score of 3 or higher)		Creek culvert that is structurally sound with some minor problems and a moderate risk of failure (likelihood score of 2)							
Operational Efficiency	Is this an opportunity to solve a problem that will reduce operational/maintenance burden related to a chronic issue?	D W W	Description of ongoing operational or maintenance burdens (Maximo data)	Anticipated reduction in resources or costs associated with **high** chronic maintenance or operational inefficiency		Anticipated reduction in resources or costs associated with **moderate** chronic maintenance or operational inefficiency		Anticipated reduction in resources or costs associated with **low** maintenance or operational inefficiency	Does not represent above normal operational or maintenance costs	8%	0.25	0.02	

Drainage and Wastewater Ranking Criteria

Draft: December 7, 2017

A and B Street SW - SAMPLE

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DWW Ranking Criteria integrated with NDS Partnering site selection criteria

Criteria Name	Guiding Questions		Data Sources (see WebMap)	Rating Scale						Weights	Raw Score	Weighted Points	Scoring Notes
				High (1)	Moderate High (0.8)	Moderate (0.5) or 0.6 where specified	Moderate Low (0.4)	Low (0.25)	No points				
OPPORTUNITIES													
Service Equity	Is the problem in an area with long-standing inequities?	*D* *W* *W*	Service Equity Criteria Ranking Map	Problem is in a shaded area (orange or red) and has medium to high on-block support		Site is within the school boundary area for West Seattle, Sanislo, Highland Park, or Roxhill and has medium to high on-block support			Area has comparatively low or no known disparity issues.	6%	1	0.06	
Opportunity to reduce costs	Is this an opportunity to reduce claims/lawsuit costs?	*D* *W* *W*	Description of ongoing costs to recover from damages	Anticipated reduction in resources or costs associated with damages paid through claims and/or lawsuits **AND** A potential to share costs on solutions (O&M and CIP cost reduction potential >$1M)		Anticipated reduction in resources or costs associated with damages paid through claims and/or lawsuits (O&M reduction only - continued costs of inaction) **OR**		Anticipated reduction in resources or costs associated with damages paid through claims and/or lawsuits (O&M reduction only - continued costs of inaction) **OR**	Little or no cost or resource savings	5%	1	0.05	Claims from previous flooding. SDOT sidewalk partnering.
	Is this an opportunity to reduce capital costs through partnership?		Description of cost-sharing opportunity			**OR** Anticipated potential to share costs on solutions and mobilization (CIP cost reduction only >$1M) e.g., Swale on Yale		**OR** Anticipated potential to share costs on solutions and mobilization <$1M				0	
Time-sensitive coordination	Is this an opportunity to solve a problem that will be lost, or more difficult, if it is not addressed now?	*D* *W* *W*	SPU Switchboard priority (factors in 5-year moratorium in ROW)	A limited time opportunity for SPU to coordinate with other departments, agencies, jurisdictions, or private developers to reduce impacts.(e.g., HLKK)					There is no time-sensitive opportunity.	6%	1	0.06	
Multiple benefits	Is this a problem that is likely to provide multiple benefits once addressed?	*D* *W* *W*	Description of multiple problems to be addressed or opportunities to meet multiple priorities for the City.	Addresses multiple issues within and across lines of business (e.g., flooding, aging water mains, sewer backups, fish passage barriers) **AND** Supports multiple City Programs/Plans or Neighborhood Plans (e.g., Pedestrian Master Plan, NGW, Rapid-Ride corridors, etc.)		Addresses multiple issues within and across lines of business (e.g., flooding, aging water mains, sewer backups, fish passage barriers) **OR** Supports an additional City Program/Plan or Neighborhood Plan (0.5)			Singular issue and/or not anticipated to provide multiple benefits	6%	1	0.06	
On-block support	Considers support from customers who live adjacent to project		Outreach efforts (e.g., surveys, door-to-door)	Customers who live adjacent to proposed installations are in favor and project has strong overall block support	Customers adjacent to proposed installations are either neutral or in favor of project	Mixed support on block (in favor, neutral, and opposed)		Opposition from customers adjacent to installations	Strong overall opposition from block	13%	0.8	0.104	

Sample based on a street concept for SPU's Longfellow NDS project. Street name has been removed. Contact SPU 's LOB rep. for full OA report

Drainage and Wastewater Ranking Criteria

Draft: December 7, 2017

A and B Street SW - SAMPLE

Guide evaluation of drainage and wastewater system problems and partnering opportunities

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DWW Ranking Criteria integrated with NDS Partnering site selection criteria

				Rating Scale									
Criteria Name	**Guiding Questions**		**Data Sources (see WebMap)**	**High (1)**	**Moderate High (0.8)**	**Moderate (0.5) or 0.6 where specified**	**Moderate Low (0.4)**	**Low (0.25)**	**No points**	Weights	Raw Score	Weighted Points	Scoring Notes
REQUIREMENTS													
Regulatory	Do federal, state or city laws require the problem to be addressed? *(May also include consent decrees to follow laws)*	*D W W*	Cite applicable regulation/law requirement *Example sources: CSO Consent Decree, the Endangered Species Act and the Clean Water Act and their supporting mandates, as found in the Seattle Municipal Code, the City's Stormwater or Wastewater Permit with the Washington State Department of Ecology*	A federal, state agency or city regulation requires the specific problem to be addressed.					Is not related to any regulations or service levels.	n/a	1		
Mandates, legal agreements	Is deciding to address this problem required through legal documents such as MOAs or Mayoral/Council directives? *(These are generally initiated at the City or County levels)*	*D W W*	Cite applicable legal requirement or directive. *Example sources: SPU Strategic Business Plan Action Plan, Mayoral Directive, City Council Resolution or Ordinance, City Council Statement of Legal Intent, Central Budget Office budget directive, Interdepartmental or Intergovernmental agreements, Memorandum of agreement or understanding.court or claim settlement, Executive Order, Court orders*	A legal document or directive requires the issue to be addressed		0.104			Is not related to any legal requirements.	n/a	1		
			Category assigned to ROW projects impacting SPU infrastructure (e.g., Move Seattle project)	Required to relocate or replace assets impacted by external project (other departments, agencies, jurisdictions, or private developers) (Category 2)		Involves upsizing to increase capacity (Category 3) or general repairs or protection of DWW assets (Category 1)							
										101%			
										Total Points		0.64	
										Raw Regulatory Points		2	

Sample based on a street concept for SPU's Longfellow NDS project. Street name has been removed. Contact SPU 's LOB rep. for full OA report

Appendix K: Sample Concept Design Documentation

- Sample SPU NDS CIPs Datasheet for Documenting Concept Option from SPU NDS Projects
- Sample SPU NDS CIP Datasheet Completed for a Block Concept in SPU’s Longfellow Project

Natural Drainage Systems Data Sheet (for use in Creek Watersheds)

Project Number: _____ Block ID#: __

Project Location: ____

Notes to users of this document: Text in red with italics is intended to be instructions to the user describing the type of content to be included in that section. The text is to be removed by the user when information is completed.

Project Location and Extents

- *Briefly describe the location and extents*
- *Note and reference contiguous blocks related to the project location (for consideration of Stormwater code thresholds)*

Project Description

- *Briefly describe the proposed concept for this block,*
- *Briefly summarize proposed grading and conveyance improvements and explain how improvements will impact (e.g. increase) the connectivity of stormwater runoff from the project area to the downstream point of discharge*
- *insert schematic of solution (e.g. GIS based or other approved base). And provide at larger scale as a separate document*
- *describe if it has been identified as cost-share opportunity*

Project Number: _____ Block ID#: __

Project Location: ____

Total Contributing Area Summary

Description	**ROW Hard Surface Area (sf)**	**EIF for ROW**	**ROW EIA (sf)**	**Parcel Area to ROW (sf)**	**EIF for Parcel**	**Parcel EIA (sf)**	**Total EIA (sf)**

PGHS and Non-PGHS in the table below shall be the total effective area. NDS bottom area should be sized to mitigate the total effective impervious area.

Description	**ROW PGHS** (i.e. road, driveways) sf	**ROW NON-PGHS** (i.e. sidewalks, paths) sf	**ROW Pervious** (i.e. Landscape, grass) sf	**NDS Bottom Area (sf)**

Abbreviations:

ROW = Right-of-Way

sf = square feet

EIF = Effective Impervious Factor

EIA = Effective Impervious Area (ROW Area * EIF)

PGHS = Pollution Generating Hard Surface

Area managed*:

☐ Less than entire block is managed (but at least 3,000 sf PGIS)
☐ Entire block is managed
☐ Manages runoff from adjacent block
☐ Manages runoff from adjacent block**s** or infiltration is likely possible plus entire block is managed

*Preferred 0.8% sizing factor, 0.3% sizing factor minimum

For completing the above

- *If you are managing the water on the block that you are working on, then you are managing the entire block, regardless of whether or not the block is 330 or 660'*
- *If the adjacent block is 330 feet and being managed on the block you are working on then check "manages runoff from adjacent block"*
- *If the adjacent block is 660 feet or several 330' blocks then check the last box*

Concept plans (see attached)

See attached concept plans.

Project Number: _____ Block ID#: __

Project Location: ____

Stormwater Code Requirements

Note: SPU DWW utility cuts should be included in totals below; non-SPU DWW utility cuts can be excluded from totals.

Description *(list each block and ID)*	**New and Replaced Hard Surfaces**		**Pollution Generating Hard Surface (sf)**		**NDS Bottom Area required by code (sf)***	**NDS Bottom Area provided (sf)**
	New	**New + Replaced**	**New**	**New + Replaced**		
Total**						

*From pre-sizing tables (5.18 and 5.20) in the Stormwater Manual January 2016 in Volume 3 – Project Stormwater Control, if applicable.
** The total NDS bottom area shall

- Requirements (check all that apply):

Project Type	☐ Sidewalk or Trail Project**	☐ Roadway Project (<35% impervious)	☐ Roadway Project (>35% impervious)
On-site Stormwater Management	☐ (greater than 2,000 sf new and replaced hard surface)	☐ (greater than 2,000 sf new and replaced hard surface)	☐ (greater than 2,000 sf new and replaced hard surface)
Flow Control	N/A	☐ project adds 5,000 sf or more of new hard surface and the total new and replaced hard surface is 10,000 sf or more)	☐ the total new and replaced hard surface is 10,000 sf or more)
Water Quality	N/A	☐ greater than 5,000 sf new and replaced hard surface	☐ greater than 5,000 sf new pollution generating hard surface
WQ treatment area equals total new plus replaced	N/A	☐ new PGHS adds more than 50% to the existing hard surface within the project area.	N/A

**A “Sidewalk Project” means a project for the creation of a new sidewalk or replacement of an existing sidewalk, including any associated planting strip, apron, curb ramp, curb, or gutter, and necessary roadway grading and repair. If the total new plus replaced hard surface in the roadway exceeds 10,000 sf, the entire project is a roadway project. (The total area in the roadway is to

Project Number: _____ Block ID#: __

Project Location: ____

exclude opportunity work, work that is not contiguous or integral to the project, such as pavement restoration from utility trench restoration for bringing in water from the opposite side of the street, shall not be included in this quantity).

Note if project is contiguous (or potentially contiguous to adjacent blocks in consideration for NDS), thresholds shall be evaluated for the combined potential project area and note herein. Number in table above should apply to individual blocks to compare net benefit above code on a block-by-block basis.

- Describe how Stormwater Code requirements are proposed to be addressed (bioretention for NDS partnering is sufficient to meet requirements? Flow control structure is required? Other? If modeling is required, note that LOE was not scoped for modeling and will be evaluated in Design. Please provide your best estimate/gut-check.):

Flow Mitigation Summary

Provide qualitative review of potential need for supplemental storage to mitigate flows discharging downstream. For example, if the project directs more flow to the downstream system by plumbing larger than one block of previously disconnected area due to solving a localized flooding problem. Provide your best estimate, while stating your assumptions.

Geotechnical Analysis Summary

SPU Geotech to provide for each block. Include location in area unsuitable for infiltration (if applicable), likelihood of liners (some cells or entire block), likelihood for high groundwater, and/or potential to infiltrate without underdrains.

Outreach Results Summary

SPU Communications to provide for each block. Include qualitative review of on-block support for the project considering proportion of residents contacted.

Existing Drainage Infrastructure Summary

Describe existing drainage infrastructure, e.g. formal vs. informal drainage, qualitative summary of level of service for conveyance and presence of known or likely flooding problems. If undocumented flooding was observed in the field, provide as much quantitative information as possible within scope and work with SPU LOB to assign Manning Method rating. If site has already been analyzed as a flooding site, reference the Localized Flooding datasheet here.

Additional considerations

SPU to identify and describe the following:

- *Cost-sharing opportunities, e.g. hard or soft cost sharing, SPU or partner led*

- *Co-benefits, e.g. interact/overlap with other City program or plan, e.g., NGW, Ped Master Plan, DPD Neighborhood Plans, Low-cost sidewalks, Multimodal corridor, Localized flooding*
- *Equity/RSJ factors unique to this alternative not expressed above (if any). SPU to determine if there are any indicators that this block is within an underserved community and/or there are potential barriers to participation? SPU to determine if this block is located within the elementary school collection areas with the highest diversity of languages and lowest income? Are there needs for language translation support?*

Site Selection Criteria Matrix Table Summary

See attached matrix table.

Identify known data gaps and risks

Coordinate with project team to include information from multiple disciplines including geotechnical engineer, hydrogeologist, outreach lead, civil engineer, and landscape architect.

Project Number: _____ Block ID#: __

Project Location: ____

Cost Estimate

For each concept or alternative, Level 5 cost estimates based on costing tool provided by SPU. All projects to assume soft cost, MRF, and contingency reserves provided below unless site specific considerations are documented to justify modification. Attach assumptions used in costing tool for estimating the construction cost. Indicate if the cost includes escalation from unit prices used in the costing tool.

Cost Type		
Hard Cost	**Construction Cost Subtotal** *(from SPU Cost Estimating Tool)*	**$**
	Allowance for Indeterminates	30.0%
	Adjustment for Market Conditions	0.0%
	Construction Bid Amount	**$**
	Sales Tax Percentage	10.1%
	Sales Tax Amount	$
	Construction Contract Amount	**$**
	Construction Cost Total	**$**
Soft Cost	Soft Cost Percentage	60.00%
	Soft Cost	**$**
Base Cost	**Base Cost**	**$**
Reserves	Contingency Reserve Percentage	25%
	Contingency Reserve	$
	Management Reserve Percentage	15%
	Management Reserve	$
	Project Reserves	**$**
	Total Cost	**$**
	Total Cost (Rounded)	**$**

Project Number: L2019 Block ID#: 24 BA-HE
Project Location: 24th Ave SW: SW Barton Pl to SW Henderson St

Project Location and Extents

The project is located along 24th Avenue SW between SW Barton Place and SW Henderson Street. The street is located within the Westwood/Highland Urban Village and is an Urban Village Neighborhood Access street per SDOT's Right-of-way Improvement Manual Streets Illustrated, 2017. Currently the parcels along the block are single family residential.

This block is part of the contiguous blocks of 24th Avenue SW between SW Barton Pl and SW Cloverdale Street. NDS data sheets #: 24 BA-HE, 24 HE-TR, and 24 TR-CL.

Project Description

The proposed project is to address a localized flooding condition for the 24th Avenue SW mid-block closed depression. The proposed concept includes:

- installing roadside bioretention with an underdrain along both sides of this curbless street;
- widening the existing paved road width to 25-feet for City standard;
- providing an asphalt thickened edge along the widened road edge to convey runoff,
- installing a public storm drain main extension for conveyance from roadside bioretention;
- installing chicanes on SW Henderson Street east of 24th for traffic calming and to improve conveyance;
- installing a 6' sidewalk and 5' planting strip with street trees along the west side of the street, which would allow for a cost-sharing opportunity with SDOT; and
- installing a catch basin/flow splitter on SW Barton Pl to direct runoff to bioretention on 24th Ave SW.

The cells on the west side of the block are assumed to be lined due to geotechnical considerations (houses sit lower/have basements below the ROW).

Subbasin delineation map (Areas E1, E2, E3 and E4) and proposed concepts are shown in Attachment 1 (see pages 1, 2, 2a and 3a for concepts).

Concept #1a includes installing all the improvements except for the flow splitter ad two southern cells receiving flow from SW Barton Pl.

Concept #1b is the same as Concept #1a except the chicane on the north side of SW Henderson Street is not included.

Concept #2 includes installing all the improvements shown on pages 1-3a including diverting flow from SW Barton Pl arterial onto 24th Avenue SW via a flow splitter.

Project Number: L2019 Block ID#: 24 BA-HE
Project Location: 24th Ave SW: SW Barton Pl to SW Henderson St

Total Contributing Area Summary

Street Description	**Sub-basin ID#**	**ROW Hard Surface Area (sf)**	**EIF for ROW**	**ROW EIA (sf)**	**Parcel Area to ROW (sf)**	**EIF for Parcel**	**Parcel EIA (sf)**
Concept 1a & 1b SW Henderson to SW Barton Pl	E1, E2 and E3	40,280	0.95	38,270	166,400	0.12	19,970
Concept 2 SW Henderson to Barton Pl + Arterial	E1, E2, E3 and E4	55,080	0.95	52,330	166,400	0.12	19,970

Description	**TOTAL PGHS** (i.e. road, driveways) sf	**Total EIA (sf)**	**NDS Bottom Area** (sf) Shown on concept
Concept 1a & 1b SW Henderson to SW Barton Pl	36,700	58,240	420 (includes 140 sf lined bottom area)
Concept 2 SW Henderson to Barton Pl + Arterial	47,050	72,300	490 (includes 210 sf lined bottom area)

Abbreviations:

ROW = Right-of-Way
sf = square feet
EIF = Effective Impervious Factor
EIA = Effective Impervious Area (ROW Area * EIF)
PGHS = Pollution Generating Hard Surface

Area managed*:

☐ Less than entire block is managed (but at least 3,000 sf PGHS)
☐ Entire block is managed (>8,000 sf)
☐ Manages runoff from adjacent block (>16,000 sf)
☒ Manages runoff from adjacent blocks or infiltration is likely possible plus entire block is managed

*Preferred 0.8% sizing factor, 0.3% sizing factor minimum

NOTE: The table above does not capture the removal of existing gravel shoulders subject to vehicular traffic that are located outside of the proposed widened roadway, which is defined by the asphalt thickened edge, or the removal of existing compacted gravel areas where the new planting strip is located with the new sidewalk. The proposed concept reduces the PGHS from the existing condition.

Concept plans See Attachment 1.

Project Number: L2019 Block ID#: 24 BA-HE
Project Location: 24th Ave SW: SW Barton Pl to SW Henderson St

Stormwater Code Requirements

Note: SPU DWW utility cuts should be included in totals below; non-SPU DWW utility cuts can be excluded from totals.

Description	**Roadway Area (sf)**		**Pollution Generating Hard Surface (sf)**		**New and Replaced Hard Surfaces (sf)**	
	New	**New + Replaced**	**New**	**New + Replaced**	**New**	**New + Replaced**
Concept 1a & 1b SW Henderson to SW Barton Pl	0	5140	0	6940	3580	10520
Sizing Factor OSSM		5.6%*	**NDS Bottom Area required by code (sf)***			590
Concept 2 SW Henderson to SW Barton Pl + Arterial	0	5340	0	7140	3580	10720
Sizing Factor OSSM		5.6%*	**NDS Bottom Area required by code (sf)***			600

*From pre-sizing table 5.18 in the Stormwater Manual January 2016 in Volume 3 – Project Stormwater Control; based on 5.6% sizing factor assuming 6” average ponding depth and 0.15 in/hr design infiltration rate for “New and Replaced Hard Surfaces” for meeting On-site stormwater management requirement for infiltrating bioretention with an underdrain.

This block triggers flow control. See contiguous block datasheet for flow control sizing.

☒ See attached summary sheet for contiguous blocks for code triggers.

- Requirements (check all that apply):

Project Type	☒ Sidewalk or Trail Project**	☐ Roadway Project (<35% impervious)	☒ Roadway Project (>35% impervious)
On-site Stormwater Management	☐ (greater than 2,000 sf new and replaced hard surface)	☐ (greater than 2,000 sf new and replaced hard surface)	☒ (greater than 2,000 sf new and replaced hard surface)
Flow Control	N/A	☐ project adds 5,000 sf or more of new hard surface and the total new and replaced hard surface is 10,000 sf or more)	☒ the total new and replaced hard surface is 10,000 sf or more)
Water Quality	N/A	☐ greater than 5,000 sf new and replaced pollution generating hard surface	☐ greater than 5,000 sf new pollution generating hard surface
WQ treatment area equals total new plus replaced	N/A	☐ new PGHS adds more than 50% to the existing hard surface within the project area.	N/A

**A “Sidewalk Project” means a project for the creation of a new sidewalk or replacement of an existing sidewalk, including any associated planting strip, apron, curb ramp, curb, or gutter, and necessary roadway grading and repair. If the total new plus replaced hard surface in the roadway exceeds 10,000 sf, the entire project is a roadway project. (The total area in the roadway is to exclude opportunity work, work that is not contiguous or integral to the project, such as pavement restoration from utility trench restoration for bringing in water from the opposite side of the street, shall not be included in this quantity).

This block is part of a contiguous block project along 24th Avenue SW. Numbers in table above apply for just the concept of this individual block.

Complete the following to demonstrate how the project meets code:

☐ Project provides greater NDS bottom area than required by code.

☒ Project meets infeasibility criteria for infiltrating bioretention (per Appendix C in the Stormwater Manual January 2016 in Volume 3 – Project Stormwater Control, if applicable. (i.e. if liners or vertical walls are required), therefore the project meets code for on-site Stormwater management.

☐ Additional area within the block is not feasible to meet the NDS bottom area required by code for On-site Stormwater Management.

Provide additional description of how Stormwater Code requirements are proposed to be addressed (bioretention for NDS partnering is sufficient to meet requirements? Flow control structure is required? Other?

Based on the stormwater code table (see previous) to mitigate for on-site stormwater management for the new and replaced hard surfaces an additional 170 SF and 110 SF of bioretention bottom area are required for Concepts 1a & 1b and Concept 2 respectively (in addition to the 420 SF and 490 SF of bioretention bottom area proposed) and the bioretention cells would all need to be unlined. The following are options for addressing stormwater code during the design phase:

- evaluate opportunities for post-construction amendment of existing gravel shoulders outside of the proposed roadway to offset new/replaced hard surfaces and reduce the NDS bottom area required by code
- consider installing the new sidewalk as pervious concrete
- or add additional shallow rain gardens for sidewalk mitigation where new planting strip is 5' wide
- or add additional underground storage with flow control structure (e.g. detention pipe, infiltration chambers, etc); note, modeling required to determine the size of additional flow control was not included in the scope of this work.). The developed right-of-way conditions are constrained with utilities, trees, driveways and would require significant rerouting of underground storage.
- Or have the geotechnical engineer reassess if lined facilities are required on the west side to increase the areas for infiltration and/or increase the design infiltration rate.

Project Number: L2019 Block ID#: 24 BA-HE
Project Location: 24th Ave SW: SW Barton Pl to SW Henderson St

Flow Mitigation Summary

The proposed flow splitter on SW Barton Pl will route low flows to bioretention on 24th Ave SW, which conveys runoff to the PSD extension in 24th. This concept (Concept #2) directs more flow to the downstream system. However, because the rerouted flows are sized specifically for the proposed bioretention it is anticipated supplemental storage is not required.

The proposed improvements do not change the flow path for contributing areas along 24th Ave SW or SW Henderson St; runoff from SW Henderson Street previously drained onto 24th Ave SW. Runoff from these areas previously drained west/north in the public alley and connected to the PSD in Henderson St. The proposed PSD extension will connect runoff to the same pipe segment as the existing condition.

Additionally, a similar amount of impervious area is maintained from the existing to proposed condition. The new sidewalk and widening of asphalt pavement is offset with the removal of existing gravel surfaces that are located outside of the proposed widened roadway (defined by the asphalt thickened edge) and removal of existing gravel surfaces where the new planting strip is located along the sidewalk. Overall, the connectivity of the stormwater runoff is expected to decrease via the partial infiltration from the cells on the east side of the block.

Existing Drainage Infrastructure Summary

See Localized Flooding data sheet (LPD Site # 9.1 and 9.2 and GIS #54) for of this block.

The existing drainage infrastructure is informal with no formal public collection of stormwater; runoff sheet flows along pavement/gravel shoulder edge.

Currently stormwater that flows into the ROW (from adjacent parcels, from SW Henderson Street east of 24th Avenue SW and runoff that overflows from the catch basin in Barton Pl SW when the grate becomes blocked with debris) ponds at the midblock closed depression on the west side of the street. Stormwater either infiltrates or appears to overflow into a private service drain catch basin at 9033 frontage.

From site reconnaissance, it appears the private service drain of 9033 flows through the parcel and daylights into the alley and then into the storm drain collection system at the north end of the alley. From the alley, the flow goes into the 24-inch PSD in SW Henderson Street then into PSD in 25th Avenue SW, which eventually outfalls into Longfellow Creek north of SW Thistle Street.

Geotechnical Analysis Summary

SPU Geotechnical Engineering completed two Geotechnical Memorandums dated March 28, 2017 and August 24, 2017 with recommendations for preliminary design including locations where it is recommended that the cells be lined. See Attachment 2. SPU also installed a piezometer in a boring (#B-103) midblock on the block to the north (see attached map in Attachment 2) and measured monthly water level readings between December 2016 through October 2017. Based on SPU readings, the highest measured water level reading was 15.75 feet below existing ground surface in February 2017.

SPU geotechnical recommends lining the bioretention cells on the west side of the street (at 9033 and 9027 frontage) due to topography, proximity to basements and subsurface soil conditions, unless further soil investigations and information determines otherwise.

Outreach Results Summary (provided by SPU Outreach Consultant)

The SPU communications team engaged the 24th Ave SW from SW Barton Pl. to SW Henderson St. using several methods from May 2017 – October 2017. Communication methods included an initial mailer, door-to-door outreach, two drop-in sessions, a Q&A letter, and ongoing email/phone communication. Our outreach efforts asked residents to provide information about drainage issues and their level of support for a project both on their block and in front of their house. It also provided residents with an opportunity to ask questions about the project. The information gathered about the level of support for the project is summarized in the table below.

Please note that any discrepancies between the resident's support on their block versus in front of their house are listed below the table.

On-Block Support	**Count**
Number of total households	13
Number of households reached	10
Percentage of households reached	77%
Number of households that are **supportive** (somewhat or very supportive)	5
Number of households that are **neutral** (neither supportive nor unsupportive)	1
Number of households that are **not supportive** (somewhat or very unsupportive)	0
Percentage of households that support NDS	50%
On-Block Support Score	3

[*] 6 of 10 households provided input towards their level of support for NDS.

Discrepancies of support for NDS on their block vs. in front of their house:

- Resident at 9033 24th Ave SW was neutral for NDS in front their home but very supportive of it on their block.

Additional considerations

- This block has a cost sharing/partnering opportunity with SDOT for installation of a sidewalk with planting strip (new street trees) between SW Barton Pl and SW Cloverdale Street.
- Improvements would address localized flooding.
- From SPU, this site is within an area of moderate or significant ranking level of known racial or socioeconomic disparity.

From SPU Outreach Consultant:

- This block is located within the Roxhill Elementary School attendance area.
- There is no multifamily housing located in this site.
- No households from the SPU communications interactions indicated language assistance is required.

Site Selection Criteria Matrix Table Summary

See attached table of the matrix for the concepts.

Identify known data gaps and risks

1. Additional soil information needed to determine if liner is not needed for facilities on the west side.
2. Utility locates to be conducted to locate depths and horizontal location of existing side sewers in order to determine which will need adjustment during construction.
3. At start of Design phase, Puget Sound Energy to identify which existing gas services may require full replacement to the gas meter at the house (given age/condition/type of pipe) versus partial replacement in the right-of-way when the service needs to be adjusted for installing the improvements. This cost was assumed to be covered in the Allowance for Indeterminates in the planning level budget estimate as described in the GSI program cost tool guide.
4. Due to the new sidewalk and bioretention cell siting, encroachments will need to be relocated and on-street parking patterns to change, requiring outreach with adjacent parcels.
5. Concept and siting of cells is based on 25’ road width (for current Neighborhood Yield street standard and based on discussion with Trevor Partap, SDOT on 9/21/2017). The road width for Urban Village Neighborhood Access has varying road width (including one way traffic for curbless) from 14’ to 38’. There is a potential the width may change and recommend confirming in writing with SDOT so that City / SPU assets can be sited accordingly to protect it from future relocation with ROW improvements that may occur with development in the Urban Village.
6. Need arborist review of potential impacts to existing large conifer trees adjacent to ROW at 9000 24th Ave SW and 9033 24th Ave SW, and large deciduous tree at 9003 24th Ave SW.

Project Number: L2019 Block ID#: 24 BA-HE
Project Location: 24th Ave SW: SW Barton Pl to SW Henderson St

Cost Estimate

Note, due to scope limitations only a cost estimate for Concept #2 is included. The cost of Concept #1a and 1b would be less for the reduced scope of improvements.

Cost Type		
Hard Cost	**Construction Cost Subtotal (from GSI Calculator)**	**$ 642,700.00**
	Allowance for Flow Control	**$ 96,000.00**
	Allowance for Indeterminates	30%
	Construction Bid Amount	**$ 960,310.00**
	Sales Tax Percentage	10.10%
	Sales Tax Amount	$ 96,991.31
	Construction Contract Amount	**$ 1,057,301.31**
Soft Cost	Soft Cost Percentage	60.00%
	Soft Cost	**$ 634,380.79**
Base Cost	**Base Cost**	**$ 1,691,682.10**
Reserves	Contingency Reserve Percentage	25%
	Contingency Reserve	$ 422,920.52
	Management Reserve Percentage	15%
	Management Reserve	$ 253,752.31
	Project Reserves	**$ 676,672.84**
	Total Cost - Concept #2	**$ 2,368,354.93**
	Total Cost - Concept #2 (Rounded)	**$ 2,368,000.00**

Volume II - Options Analysis Appendix
Sample documentation of estimating construction costs for a potential block concept using the GSI Budget Estimating Tool

Attachment 4 – Detailed Cost Estimate Output from GSI Cost Estimating Tool (for each site)

	A	B	C	D	E	F	G	H
1		Longfellow NDS Partnering - 24th Avenue SW from SW Barton Pl to SW Henderson Street - Concept #2						
2	**Project No.:**			SPU #L2019		**Date Prepared:**	29-Nov-17	
3	**Prepared by:**			kg		**Checked by:**	0	
4	**Project Manager**			NP				
5	**OPTIONS ANALYSIS/PROBLEM DEFINITION PHASE ESTIMATE**							
6	**Project Description**							
7	**Install roadside bioretention to provide water quality treatment for ROW runoff. Install PSD extension and install public storm drainage collection structures at midblock closed**							
8	**depression. Sidewalk improvements with planting strip for SDOT Partnering.**							
9	**Project to address localized flooding**							
10	**This estimate includes chicanes east of 24th on SW Henderson Street for traffic calming for SDOT partnering**							
11								
12								
13	**Note to Users: Please refer to user guide for assumptions on quantities and cell sections. Average bottom length of cell = 16'.**							
14								
15	**PROJECT PARAMETERS**							
16	Bioretention Cell Lengths:							
17	Bioretention Cell Templates are Illustrated in the User Guide			Note: 0% Curb & Gutter equals a curbless street				
18			Option 1			Option 2		
19	Cell Type	Bottom Length in Feet	Liner %	Curb & Gutter %	Bottom Length in Feet	Liner %	Curb & Gutter %	
20	Type 1	0.00	0%	0%	0.00	0%	0%	
21	Type 2	0.00	0%	0%	0.00	0%	0%	
22	Type 3	75.00	100%	0%	0.00	0%	0%	
23	Type 4	90.00	0%	0%	0.00	0%	0%	
24	Type 5	0.00	0%	0%	0.00	0%	0%	
25	Type 6	0.00	0%	0%	0.00	0%	0%	
26	Type 7	0.00	0%	0%	0.00	0%	0%	
27	Type 8	0.00	0%	0%	0.00	0%	0%	
28	Type 9	0.00	0%	0%	0.00	0%	0%	
29	Type 10	0.00	0%	0%	0.00	0%	0%	
30	Type 11	0.00	0%	0%	0.00	0%	0%	
31	Type 12	0.00	0%	0%	0.00	0%	0%	
32	Conveyance Swale	0.00	N/A	N/A	0.00	N/A	N/A	
33	Conveyance Pipe	0.00	N/A	N/A	0.00	N/A	N/A	
34		**OPTION 1 NOTE: If underdrain goes into deep infiltration (UIC Wells or Pit Drains), specify quantities for deep infiltration below.**						
35								
36				Option 1	Option 2			
37	Will Type 1, 2, 11, and 12 Sections Require Underdrains?			**Yes**	**No**			
38								
39	What percentage of Cells require automatic irrigation?			**0%**	**[percent]**			
40								
41	What percentage of Cells will be handwatered for plant establishment (no irrigation)?			**100%**	**[percent]**			
42								
43	Will Bioretention Cells Require UIC Wells?			**No**	**No**			
44								
45	If yes, how many UIC wells will be installed?			**[UIC Wells, each]**	**[UIC Wells, each]**			
46								
47	Will Bioretention Cells Require Pit Drains?			**No**	**No**			
48								
49	If yes, how many Pit Drains will be installed?			**[Pit Drains, each]**	**[Pit Drains, each]**			
50								
51				Option 1 Pit Drain Dimensions				
52		**20**	Length	**6**	Width	**12**	Depth	
53								
54				Option 2 Pit Drain Dimensions				
55		**20**	Length	**6**	Width	**12**	Depth	
56								
57				Option 1		Option 2		
58				In HMA	In Cement Concrete	In HMA	In Cement Concrete	
59	Total number of intersections to have one corner impacted?			**0**	**[Intersections, each]**	**[Intersections, each]**	**[Intersections, each]**	
60								
61	Total number of intersections to have two or more corners impacted?			**0**	**[Intersections, each]**	**[Intersections, each]**	**[Intersections, each]**	
62								
63	**Allowance for Indeterminates, this value is 20% by default**							
64	**[override]**	*Per designer's judgment, standard range is 15%-25% at Options Analysis and Problem Definition*						
65								
66	**Minimum Allowance for Indeterminates, this value is $10,000 by default**							
67	**[override]**	*Per designer's judgment*						
68								
69	**Contingency override, this value is 20% by default**							
70	**[override]**	*Per designer's judgment, standard range is 15%-25% at Options Analysis and Problem Definition*						
71								
72	**Current City of Seattle Sales Tax**							
73	**10.1%**	*Per Washington State Department of Revenue, may vary elsewhere in King County*						
74								
75	**Rounding Multiple Override, By default this is the nearest 0.1% or $1,000 (whichever is greater)**							
76	**[override]**							
77								
78								

	A	B	C	D	E	F	G	H
1	Longfellow NDS Partnering - 24th Avenue SW from SW Barton Pl to SW Henderson Street - Concept #2							
79	**Option 1 Estimate**							
80	**Item**		**Units**	**Quantity**	**Unit Price**	**Price**	**Minimum Bid Amount**	
81	Mobilization (Assumed 10% of subtotal)		LS	1.00	$ 64,265.32	$ 64,265.32	N/A	
82	Removals (Assumed 3.5% of subtotal)		LS	1.00	$ 19,559.01	$ 19,559.01	N/A	
83	Clearing and Grubbing		SF	6,481.00	$ 1.30	$ 8,425.30	$ 1,000.00	
84	Channel Excavation		CY	536.00	$ 41.00	$ 21,976.00	$ 5,000.00	
85	Pit Drain Excavation		CY	-	$ 31.00	$ -	$ 5,000.00	
86	Pit Drain Shoring		SF	-	$ 2.00	$ -	$ 1,000.00	
87	Mineral Aggregate, Type 2		Ton	80.00	$ 70.00	$ 5,600.00	$ 500.00	
88	Mineral Aggregate, Type 6		Ton	-	$ 52.00	$ -	$ 500.00	
89	Mineral Aggregate, Type 26		Ton	158.00	$ 55.00	$ 8,690.00	$ 500.00	
90	3 In. Minus Washed Rock for Pit Drains		Ton	-	$ 41.00	$ -	$ 500.00	
91	Trench Backfill		CY	-	$ 31.00	$ -	$ 1,000.00	
92	Geomembrane Liner for Cells		SY	125.00	$ 3.00	$ 1,000.00	$ 1,000.00	
93	Non Woven Geotextile Liner for Pit Drains		SY	-	$ 3.25	$ -	$ 1,000.00	
94	Underdrain MH w/sump type 204		Each	5.00	$ 5,625.00	$ 28,125.00	$ 4,600.00	
95	Catch Basin Type 242		Each	3.00	$ 3,325.00	$ 9,975.00	$ 3,325.00	
96	Underdrain 8" Dia. Slotted PVC Pipe		LF	346.00	$ 39.00	$ 13,494.00	$ 1,000.00	
97	Pit Drain Dispersal, 8" Dia. Slotted PVC Pipe		LF	-	$ 21.00	$ -	$ 1,000.00	
98	Monitoring Port for Pit Drain		Each	-	$ 517.00	$ -	$ 500.00	
99	Utility Trench Dam		Each	6.00	$ 1,550.00	$ 9,300.00	$ 1,500.00	
100	UIC Well		Each	-	$ 46,500.00	$ -	$ 45,000.00	
101	Bioretention Soil Mix		CY	164.00	$ 82.00	$ 13,448.00	$ 1,000.00	
102	Mulch, Decomposed Organic, Compost		CY	19.00	$ 77.00	$ 1,463.00	$ 500.00	
103	Mulch, Bark		CY	19.00	$ 51.00	$ 969.00	$ 500.00	
104	Bioretention Planting		SF	4,026.00	$ 11.00	$ 44,286.00	$ 1,000.00	
105	Construction Plant Establishment		SF	4,026.00	$ 1.00	$ 4,026.00	$ 1,000.00	
106	Irrigation		SF	-	$ 1.10	$ -	$ 1,000.00	
107	Irrigation Meter		Each	-	$ 3,741.00	$ -	$ 3,621.00	
108	Hand Watering - 1st Year		SF	4,026.00	$ 2.10	$ 8,454.60	$ -	
109	Irrigating - 1st Year		SF	-	$ 0.41	$ -	$ -	
110	Tree Root Barrier		LF	208.00	$ 12.00	$ 2,496.00	$ 1,000.00	
111	Pavement, HMA (Cl 1/2 IN)		Tons	47.00	$ 295.00	$ 13,865.00	$ 1,200.00	
112	HMA Thickened Edge		LF	1,200	$ 28.00	$ 33,600.00		
113	Roadway Cem Conc. 6 IN.		SY	56.00	$ 110.00	$ 6,160.00	$ 5,000.00	Alley Repaving
114	PERVIOUS Concrete Sidewalk		SY	-	$ 205.00	$ -		
115	Sidewalk Restoration		SY	364.00	$ 105.00	$ 38,220.00	$ 1,000.00	
116	ADA Ramp		Each	5.00	$ 3,400.00	$ 17,000.00	$ 2,500.00	Revised unit cost to include sidewalk restoration associated with ramps and update for COS 2017
117	Driveway Restoration		SY	167.00	$ 87.00	$ 14,529.00	$ 1,000.00	
118	Curb and Gutter, Cem Conc		LF	240.00	$ 55.00	$ 13,200.00	$ 1,000.00	
119	Doweled, Extruded Curb		LF	-	$ 71.00	$ -	$ 1,000.00	
120	Drain Curb Cut Type 1 (COS Std. Plan 295b)		Each	12.00	$ 1,136.00	$ 13,632.00	$ 1,100.00	
121	Drain Curb Cut (for 4-Wall Cell-Type 1 Section)		Each	-	$ 1,705.00	$ -		
122	PIPE, PSD, D.I., CL 52, 8 IN (or CL 50)		LF	-	$ 185.00	$ -	$ 1,000.00	
123	PIPE, PSD, D.I., CL 52, 12 IN		LF	330	$ 155.00	$ 51,150.00		
124	PIPE, PSD, D.I., CL 50, 16 IN		LF		$ 215.00	$ -		
125	TREE, Deciduous 2 IN to 2- 1/2 In Gal		Each	16	$ 385.00	$ 6,160.00		
126	Walls		LF	120.00	$ 165.00	$ 19,800.00	$ 2,000.00	
127	Street Sheetflow Test through Inlet/Curb Cuts		Street	1.61	$ 1,550.00	$ 2,495.81	$ 1,500.00	
128	Civil Structures O&M - 1st Year		Street	1.61	$ 2,066.00	$ 3,326.67	$ 2,000.00	
129	Specialty O&M - 1st Year		Street	-		$ -		
130	Temporary Erosion and Sediment Control		Street	1.61	$ 7,748.00	$ 12,475.83	$ 7,500.00	
131	Project Traffic Control		Street	1.61	$ 9,917.00	$ 15,968.35	$ 9,600.00	
132	Tree and Vegetation Protection		Street	1.61	$ 1,550.00	$ 2,495.81	$ 1,500.00	NOTES:
133	ROW Encroachment Allowance		LS	1	$ 7,000.00	$ 7,000.00		
134	PSD MH 204A for 12" PSD Extension		Each	4	$ 5,200.00	$ 20,800.00		Quantity <5 EACH, COS 2017 Unit Cost 204A
135	Connection to Existing 24" PSD at Henderson		Each	1	$ 4,000.00	$ 4,000.00		Allowance including bypass for 24"
136	Landscape outside of Bioretention		SF	2,455.00	$ 9.50	$ 23,322.50		LA estimate on Typical ROW planting strip (incl Street trees) incl watering 1st year
137	Flow Splitter Specialty CB at Barton Pl		Each	1.00	$ 8,000.00	$ 8,000.00		Include working in arterial, Specialty 240D CB with flow splitter, connect to psd
138	10" DI Conveyance Btwn Cells		LF	245.00	$ 130.00	$ 31,850.00		Use COS 2017 unit cost for 12" DI CB Connection Pipe (depth <10 feet), includes excavation & backfill
139	8" DI Connection Pipe (underdrain and CB)		LF	120	$ 105.00	$ 12,600.00		COS 2017 Unit cost for 8" DI CB (< 10' depth)
140	Stairs/Steps restoration allowance		LS	1	$ 2,000.00	$ 2,000.00		at 9033
141	ROADWAY Cem Conc. 12 IN.		sy	23	$ 150.00	$ 3,450.00		cos 2017 Unit cost #505126 (Qty<200 sy)
142	**Subtotal**					$ 642,653.21		
143	**Allowance for Indeterminates**				20%	$ 128,530.64		
144	**Subtotal with Indeterminates**					$ 771,183.85		
145	**Contingencies**				20%	$ 154,236.77		
146	**Subtotal with Indeterminate Allowance and Contingencies**					$ 925,420.62		
147	**Sales Tax**				10.1%	$ 93,467.48		
148	**Total**					$ 1,018,888.10		
149	**Total Rounded to the top three orders of magnitude (or to the rounding multiple override)**					$ 1,020,000.00		
150								
151	At Options Analysis and Problem Definition, the value for indeterminates is assumed to include roadway restoration, utility relocation, tree relocation, drainage crossings							
154	At Options Analysis and Problem Definition, the value for contingencies are assumed to include the costs related to design and construction factors not yet considered by the design team.							

Appendix L: Sample Concept Plans and Cost Estimates

- Example of a SPU Preferred Format for a technical Deliverable for Potential Block Concept for Options Analysis Project Report
- Sample Concept Plan for WTD CIP available by request from WTD
- GSI Construction Budget Estimating Tool User Guide

Attachment 1 – Potential Block Concept

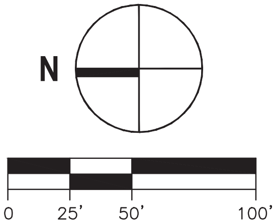
COMMENTS

1. THE CONCEPT DESIGN BOTTOM AREA OF BIORETENTION SHOWN EQUATES TO A SIZING FACTOR OF:
   - 0.6%± ON THE EAST SIDE OF 24TH
   - 0.7%± FOR THE LINED CELLS ON THE WEST SIDE OF 24TH, NORTH OF THE ALLEY
   - 0.5% FOR THE LINED CELLS ON THE WEST SIDE OF 24TH, SOUTH OF THE ALLEY.

LEGEND

▭	BIORETENTION CELL WITH UNDERDRAIN (STD PLAN 293a)
▨	LINED BIORETENTION CELL WITH UNDERDRAIN (STD PLAN 293b)
░	CURB RAMP IMPROVEMENTS/NEW SIDEWALK
↘	FLOW/SLOPE DIRECTION
▬	POSSIBLE WALL/ROCKERY WITH RAILING (AND STEPS AT ACCESS) FOR GRADE TRANSITIONS
⊙	NEW STREET TREES

SEE PAGE 2 AND 3 FOR ENGINEERING CONCEPT PLAN



Scale In Feet

Seattle Public Utilities

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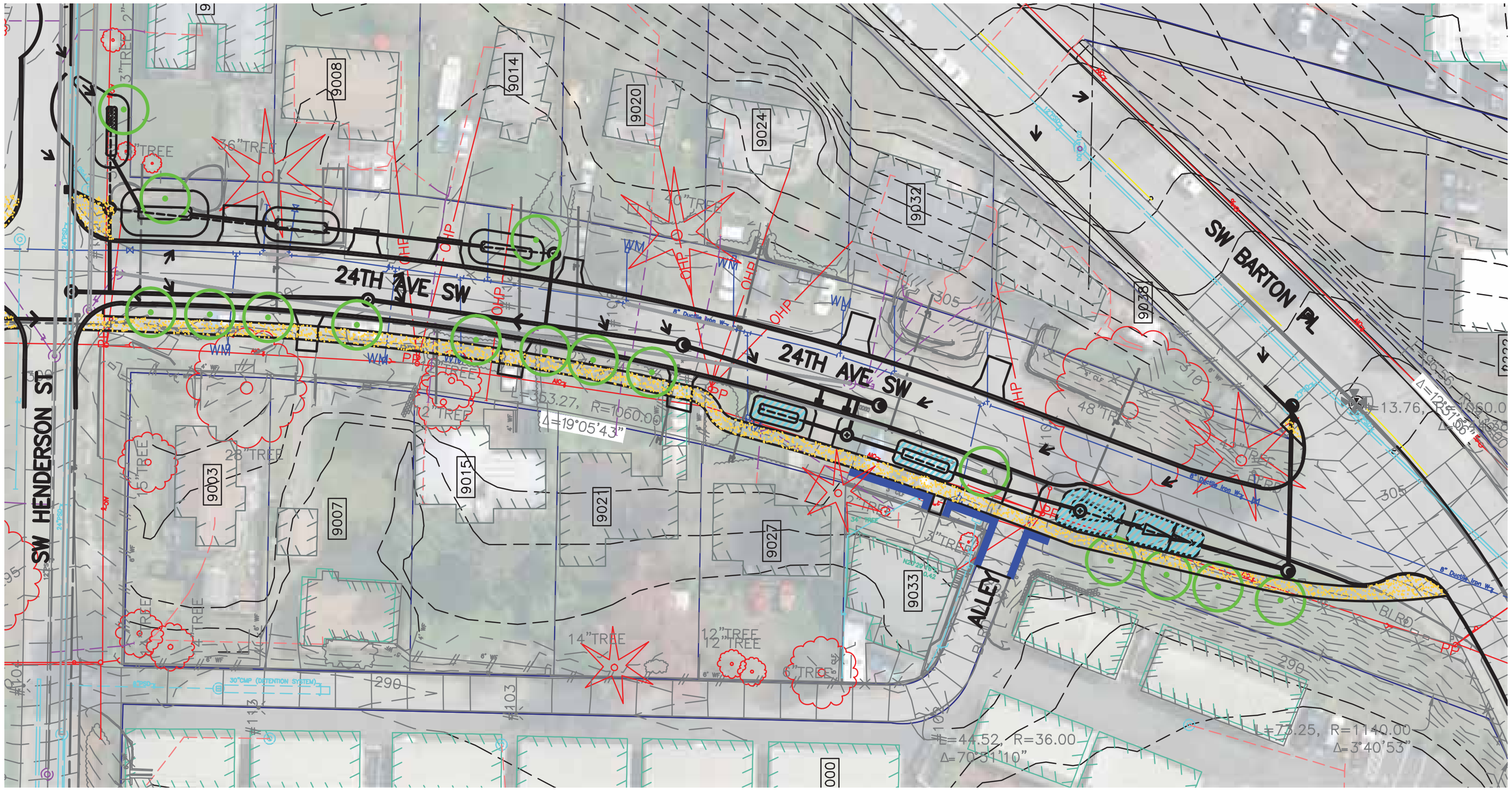
615 SECOND AVE. SUITE 280
SEATTLE, WA 98104
T 206.223.0326
F 206.223.0125
www.svrdesign.com



24th Ave SW
SW Henderson ST to
SW Barton PL

Block Overview

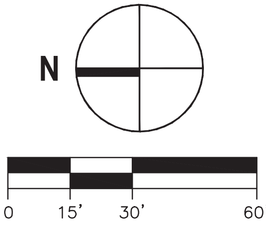
LONGFELLOW NDS
OPTIONS ANALYSIS
10/20/2017
PAGE 1

Plotted: Oct 20, 2017 – 1:24:23pm By jeffz
File: G:\15c\15077 NDS\Current\LFC_11x17 plans.dwg Layout: 1 24th-barton full

COMMENTS

1. SEE COMMENTS ON PAGE 1 AND 3 FOR BIORETENTION DESIGN BETWEEN HENDERSON AND BARTON.

2. SEE PAGE 2a FOR CROSS SECTIONS.



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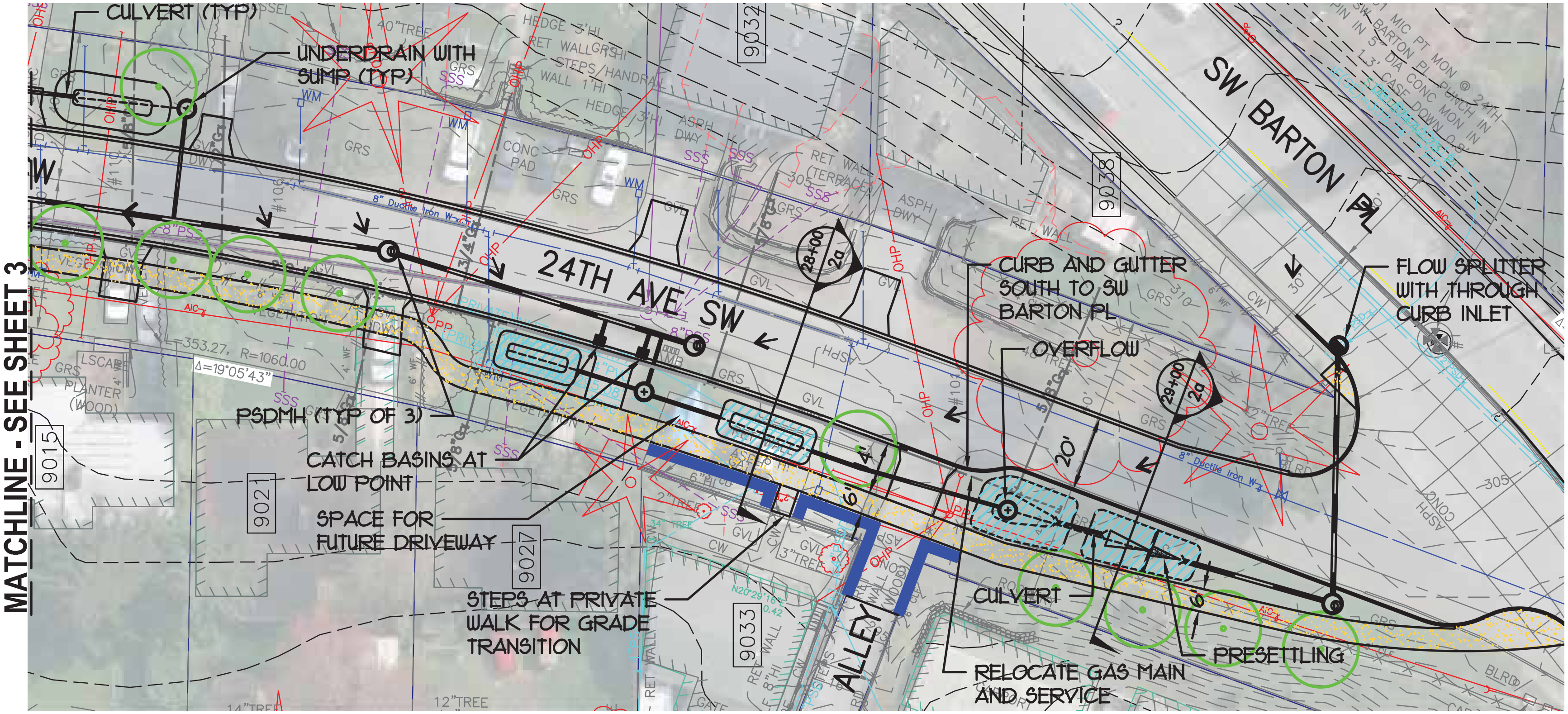

24th Ave SW
SW Henderson ST to
SW Barton PL

Engineering Concept Plan

LONGFELLOW NDS
OPTIONS ANALYSIS
10/20/2017
PAGE 2

Plotted: Oct 20, 2017 – 1:24:35pm By jeffz
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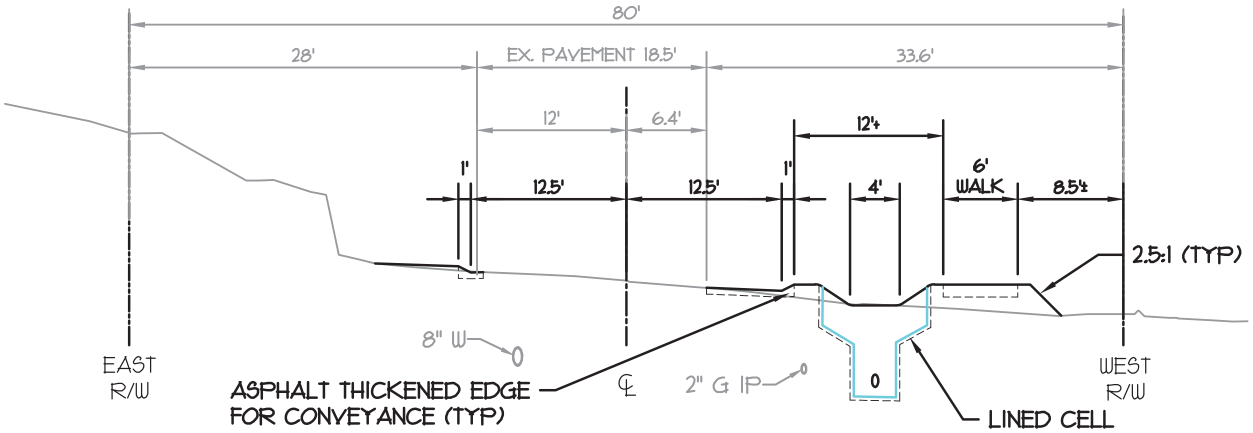
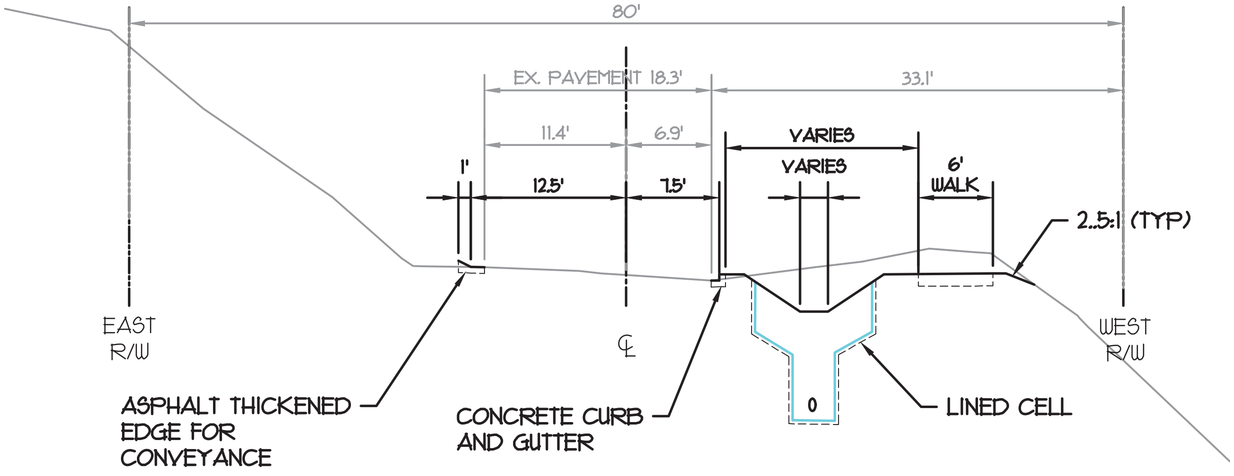


24th Cross Section at STA 28+00 on page 2



24th Cross Section at STA 29+00 on page 2

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24th Ave SW
SW Henderson ST to
SW Barton PL

Concept Sections

LONGFELLOW NDS
OPTIONS ANALYSIS
10/20/2017
PAGE 2a

Plotted: Oct 20, 2017 – 12:04:24pm By jeffz
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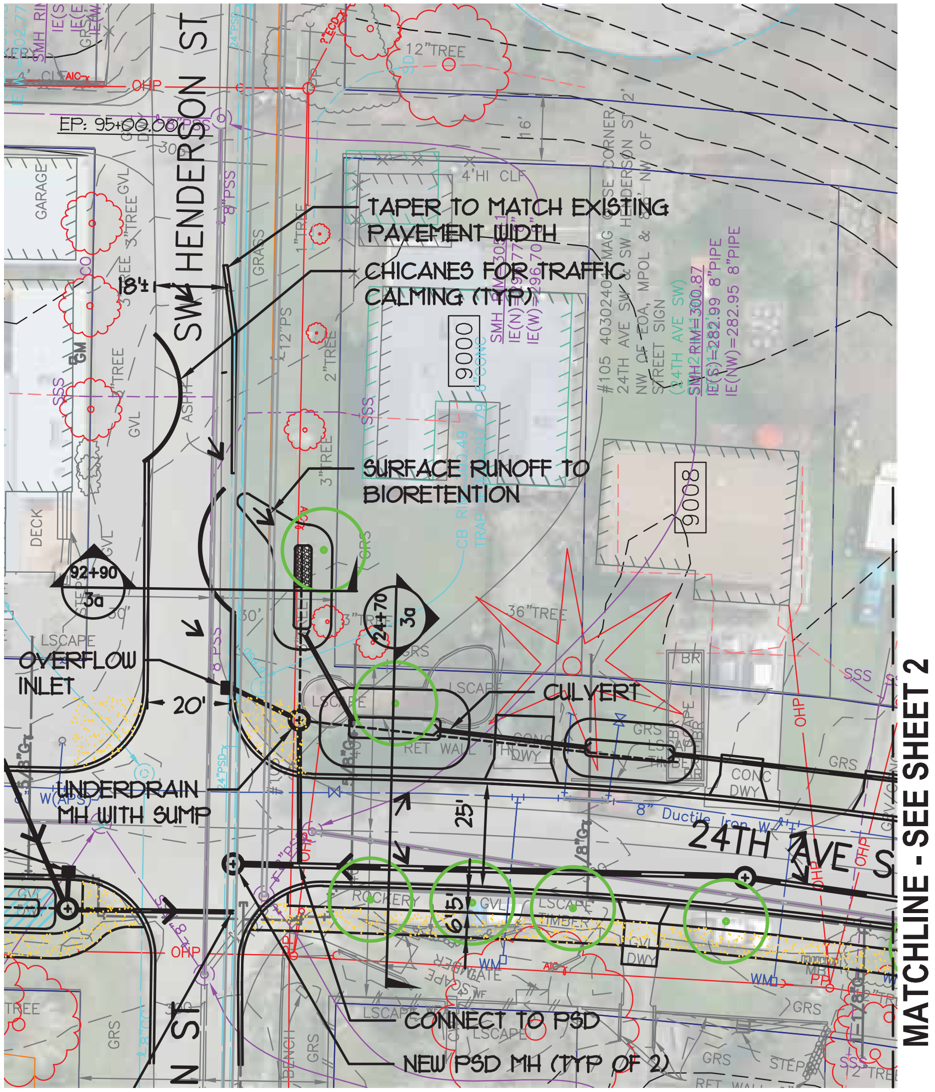
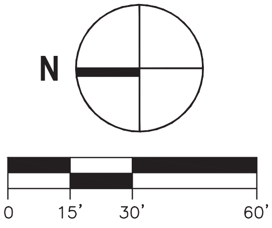


COMMENTS

1. BIORETENTION CELLS TO RECEIVE FLOW INTO AND OUT OF CELLS VIA CURB CUTS WHEN FEASIBLE.
2. PAVEMENT TAPER TO BE IN ACCORDANCE WITH SDOT.
3. DESIGN, SPACING AND LAYOUT OF CHICANES TO BE REVIEWED WITH SDOT.



Scale In Feet

Seattle Public Utilities

MIG | SvR

615 SECOND AVE. SUITE 280
SEATTLE, WA 98104
T 206.223.0326
F 206.223.0125
www.svrdesign.com

24th Ave SW
SW Henderson ST to
SW Barton PL

Engineering Concept Plan

LONGFELLOW NDS
OPTIONS ANALYSIS
10/20/2017
PAGE 3

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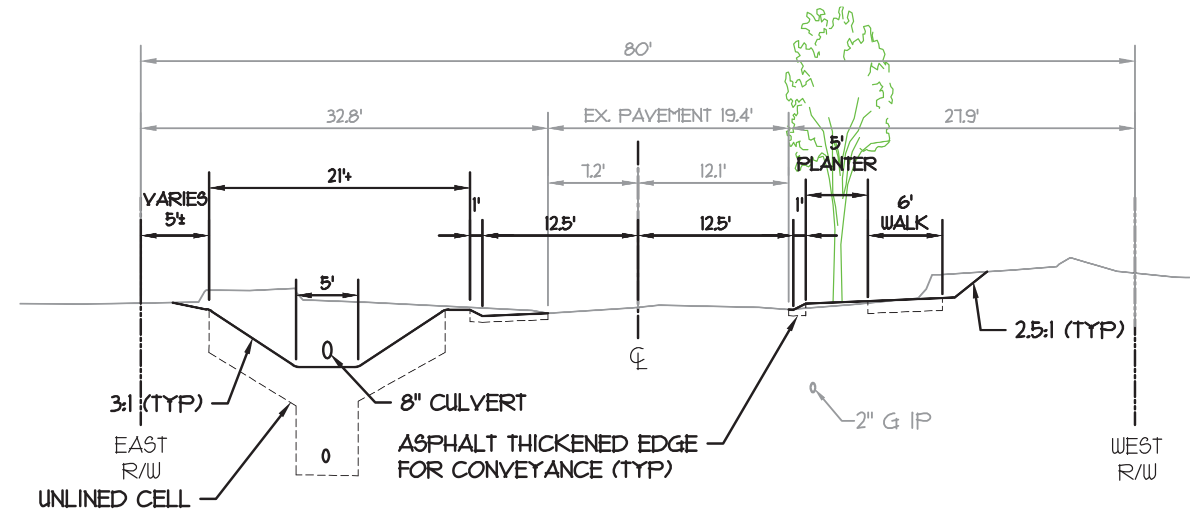
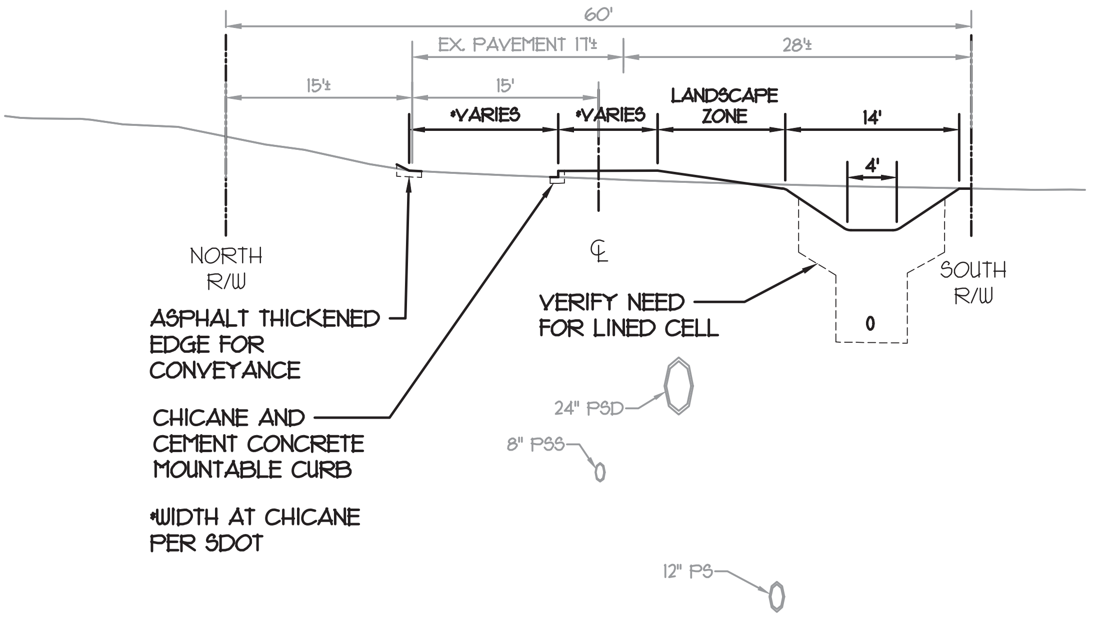


24th Cross Section at STA 24+70



Henderson Cross Section at STA 93+90

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615 SECOND AVE. SUITE 280
SEATTLE, WA 98104
T 206.223.0326
F 206.223.0125
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PAGE 3a

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King County
Department of Natural Resources and Parks
Wastewater Treatment Division
Seattle Public Utilities

USER GUIDE INSTRUCTIONS:
Initiation and SPU's Option Analysis/WTD's Problem Definition Phases
GSI CONSTRUCTION BUDGET ESTIMATING TOOL
For Retrofitting Neighborhood Yield Streets with Bioretention
January 2018 Update

Startup Notes:

The Green Stormwater Infrastructure (GSI) Construction Budget Estimating tool is meant to assist in documenting assumptions for planning level budget estimating and to supplement Seattle Public Utilities (SPU) and King County Wastewater Treatment Division's (WTD) construction budget estimating process. It is not intended to replace the respective agencies processes. This tool has been set up for construction budget estimating for retrofitting Neighborhood Yield streets with roadside bioretention facilities and associated infrastructure/restoration.

Prior to using the GSI Construction Budget Estimating Tool for planning GSI capital projects all users should review SPU's and WTD's cost estimating guidelines to properly document their assumptions and to prepare a "Basis of Estimate" document.

The **GSI Construction Budget Estimating Tool** makes frequent use of the Microsoft Excel MROUND function, to correctly use the tool, please activate the Excel Analysis Toolpack under Options.

When starting a new project, users should start with a blank, unmodified copy of the budget-estimating tool worksheet.

Under normal operating conditions of the tool, when using the default calculations built into the tool, cells in the excel spreadsheet not requiring input will be password locked to avoid accidental modification of the tool.

This tool is owned and updated by SPU and WTD designated staff. When furnished to Project Teams, SPU/WTD is to provide a copy of the tool with an unmodified read-only version. Any modifications to the tool should be performed on a copy of the tool.

NOTE: *Please allow a minimum of 2 hours of time to review this user guide and familiarize yourself with the workings and assumptions of the tool.*

Introduction

The **GSI Construction Budget Estimating Tool** serves two purposes. First, the tool allows for the creation of uniform budget estimates for SPU/WTD led GSI retrofit projects along Neighborhood Yield streets (see Seattle's Streets Illustrated Right-of-Way Improvement Manual for street types) in the City of Seattle right-of-way. Second, the tool is intended to expedite the process of developing construction budget estimates (hard costs of a construction budget) for the purposes of project total budget review, tracking assumptions and for rapidly comparing the budgets of different GSI arrangements to aid the planning teams in developing a project concept that provides the most treatment/mitigation possible in the most economical manner. Soft costs (such as staff time, engineering design, construction administration) are not included in the output of the tool. See agency cost estimating guidelines for determining soft costs for a project.

The tool is intended to be used in the Planning and Pre-design Phases of a project that is retrofitting Neighborhood Yield streets with roadside bioretention. These phases being SPU/WTD's Project Initiation Phase and SPU's Options Analysis /WTD's Problem Definition. (NOTE: This tool is not to be used for the Design Phase. See SPU/WTD for preparing Design Phase construction cost estimates.)

During the Project Initiation Phase, the tool is intended to be used to develop the construction budget for the GSI component (and associated restoration) of a right-of-way improvement project where bioretention cells are intended to be retrofitted into the planting strip and mitigating flow within the block. For SPU's Options Analysis/WTD's Problem Definition Phase the tool may be used to compare the construction budget of two GSI configurations to produce an arrangement that balances budget and functionality well enough to serve as a basis of design for planning.

The tool has been developed in such a manner that a Planner or Designer using the tool need not know everything about the intended GSI project to get a construction budget estimate. Furthermore, the tool should be updated throughout the predesign phases as the Planners and Designers gain more knowledge of what the GSI improvements will involve.

The tool was developed using guidance from the City of Seattle Cost Estimating Manual. The unit prices were taken from the City of Seattle's cost estimating database, the WSDOT unit bid database (when SPU prices were not available), the GSI Program team's engineering judgment, recent SPU bid tabs for Delridge and Ballard Phase 2, WTD's Barton project, and from previous GSI projects developed by MIG|SvR, giving City of Seattle prices precedence whenever possible.

The assumptions for the bioretention sections used for the automatic calculations in the budget estimating tool are for projects implementing bioretention cells in a series in the planting strip along Neighborhood Yield streets in the City of Seattle when the cells are managing flow within the block. It has allowances for street restoration associated with implementing the bioretention within the planting strip and/or installing curb bulbs but is not intended for full ROW restoration. The user has the ability to adjust assumptions, revise/delete/add quantities, add line items and/or revise the default for allowances used in the tool.

As an alternative to using the automation built into the tool, the user has the option to utilize just the unit costs items and come up with their own quantities if their project differs significantly from assumptions in the tool. For example, if the tool is used for other scenarios such as different street types (corridors, collectors, arterials); full ROW restoration along a street length; managing flow from multiple blocks upstream through cells on a single Neighborhood Yield street; implementing bioretention not within a typical planting strip width (see assumptions); utilizing permeable pavements in the roadway/alley; installing subsurface storage chambers; or other purposes, the user can use the unit prices as a resource but will need to develop their own quantity take-offs and add/delete line items accordingly to develop the planning level budget estimate.

See the section "Document Assumptions and Making Adjustments" for how to make adjustments and/or add/delete/revise quantities and line items in the tool.

The tool was constructed in Excel, and is comprised of 5 work sheets which are described in sequential order in this document:

- **Start Here:** Basic project information is inputted on this sheet to populate the remaining two output sheets.
- **Initiation Phase Estimate:** This sheet produces a budget level estimate based on customization of a single template bioretention cell, and general project footprint information.
- **Option Analysis/Problem Definition Estimate:** This sheet produces two predesign budget estimates based on customizations of 12 bioretention cell sections produced by MIG|SvR in coordination with SPU & WTD.
- **Computations:** This sheet contains the automated calculations that output the estimate data.
- **Unit Cost Database:** This sheet contains the unit cost data used by the estimates, notes regarding minimum quantities and assumptions for unit prices (in combination with MIG|SvR's assumption memo dated September 22, 2017).

Start Here Work Sheet

"Start Here" is the first sheet that should be filled out when developing budget estimates. This sheet's purpose is to populate the other two sheets with developer identifications, development dates, and project descriptions. The following information is available for input on the "Start Here" sheet:

- **Project Name**
- **Project Number:** Seattle Public Utilities (SPU) or King County Wastewater Treatment Div. (WTD)
- **Project Manager(s):** The name(s) of the Agency Project Manager(s) for each phase.
- **Project Description:** A brief description of the Project, it's location, intended construction season, and its primary goal; creek basin, CSO basin, water quality, and/or flow control.
- **Date Prepared:** the dates the budget estimates were prepared for the Initiation Phase and the Options Analysis/Problem Definition Phase.
- **Preparer(s):** The name(s) of the Designer(s)/Planner(s) primarily responsible for the development of the estimates for each phase.
- **Checker(s):** The name(s) of the supervisor responsible for reviewing the estimates for each phase.
- **Use Minimum Bid Amounts?:** This is a Yes/No toggle that can be used to zero-out all minimum bid amounts used in the estimate. The default is set to "Yes". When set to "No" minimum charges are set to $0. Under normal situations ("Yes") minimum bid amounts are intended to prevent the underestimation of budgets for small projects, where contractors will charge higher

than typical unit prices. The off toggle ("No") is intended to allow the user to analyze the budgets of small portions of a larger right-of-way improvement project. See description at the end of this document under the Unit Cost Worksheet for more information.

General Assumptions for Planning Level Construction Budget Estimates

For automatic quantity calculations in the tool, the following assumptions have been made (please see the attached MIG|SvR memo dated September 22, 2017 for further commentary and specifics on the development of some of these assumptions and other assumptions used in the tool):

1. For every foot of bioretention cell bottom length along a Neighborhood Yield curbless street (with no vertical curb), the tool calculates that there will be 0.9 feet of conveyance piping to convey the overflow between cells (This parameter is fixed for Project Initiation, but may be overridden in the Options Analysis-Problem Definition Phase). Note: The tool does not calculate edge treatment along the curbless street to convey flow to the bioretention. The user will need estimate this quantity.
2. For every foot of bioretention cell bottom length for a section with an underdrain, the tool calculates that there will be 2.2 feet of underdrain (to account for the piping between cells).
3. For every 16 feet of bioretention cell bottom length (average cell size for blocks up to 5% longitudinal slope), the tool calculates that there will be 34 feet (longitudinal) of planting and irrigation/handwatering area along the entire width of the planter where the cell is located (to account for the graded side slopes at the ends and level area between cells in series).
   For cells with vertical sides on all sides (Type 1 section in Attachment 1), the tool calculates that there will be 35 feet (longitudinal including walls) of planting and irrigation/handwatering area along entire planting strip width (including level area between cells in series).
4. For the purposes of this planning level estimate when number of streets is unknown for estimating the TESC, traffic control, meter and tree protection it is assumed that one street (~660 LF intersection to intersection) had an average of 2,500 square feet of planting for the bioretention. For every street with GSI it is assumed there will be: $7,500 of temporary erosion and sediment control, $9,600 of project traffic control, and $1,500 of tree and vegetation protection.
5. When an irrigation system (not handwatering) is planned, in addition to basic components, the tool assumes: 1 irrigation meter, 14 square yards of cement concrete pavement restoration for the meter installation for every 2,500 square feet of bioretention planting.
6. For every 200 linear feet of underdrain the tool assumes: one COS type 204B underdrain maintenance hole (MH) with 2' sump for maintenance access for the underdrain, 1 utility trench dam, and 17 square yards of cement concrete driveway restoration.
7. For cells with one or more vertical sides (Type 1, 2, 11 and 12 sections in Attachment 1) it is assumed that there is an adjacent existing sidewalk that will be replaced for installation of the wall. It is also assumed that the sidewalks between cells with walls will be replaced to provide continuity for sidewalk alignment for pedestrians. See assumptions in Attachment 4.
8. Presettling zones at the upstream end of the cell are considered incidental in the overall lineal foot of the bioretention cell along Neighborhood Yield street when managing flow just within the block. If a project intends to manage flow from larger upstream area or arterial with a point discharge into

the cell, the user will need to add a separate line item/allowance for presettling and/or flow splitter that might be needed.

Document Assumptions and Making Adjustments

This tool was developed for both SPU and WTD use. If the user of the tool knows more specific information for unit assumptions, then they can adjust the quantities (and/or revise unit prices) in the summary tabulated within the Initiation and Options Analysis/Problem Definition worksheet and/or insert a "Discretionary Item" for a new item(s). However, this information should be documented in the user's write-up of assumptions for the budget estimate. Users are to also review the quantities calculated in the tool to confirm it is consistent with their assumptions for the project during the planning phase. For example, the tool will notify the user of the assumed total top landscape area for the bioretention cells in a series and number of streets assumed to be retrofitted (via the TESC and Traffic Control Quantities). If these assumptions differ from the planning level concept, then the user will need to modify the quantities for the units in the tool accordingly.

Initiation Phase Work Sheet and Estimate

The Initiation Phase work sheet is used to develop the first-generation planning-level construction budget estimate (hard costs) for a bioretention retrofit project. A Planner/Designer need only know a few parameters to generate a basic budget estimate. The basic estimate assumes that project will require no other additional features and work items beyond bioretention section excavation, bioretention soil placement, mulching, and planting. This sheet has additional parameters that can be set as the Initiation Phase moves towards completion; producing a more refined budget estimate. The quantities for Initiation Phase are based upon bioretention cell "Type # Sections" (see sketches provided by MIG|SvR in Attachment 1 at the end of this document) for:

- A **bioretention cell with graded side slopes**, without underdrains along an existing Asphalt Roadway (Type 5).
- A **bioretention cell with graded side slopes**, without underdrains along an existing Cement Concrete Roadway (Type 9).
- A **bioretention cell with graded side slopes and underdrains** along an existing Asphalt Roadway (Type 3).
- A **bioretention cell with graded side slopes and underdrains** along an existing Cement Concrete Roadway (Type 7).
- A **bioretention planter with one side as a concrete vertical wall** and graded side slopes remaining sides of a cell (Type 2).
- A **bioretention planter with concrete vertical wall around all four sides** of a cell (Type 1).

Note: Type 4, 6, 8, 10-12 are not used in this phase. If users intend to use them for Initiation, use the Options Analysis tab.

All cell Types can be customized with liners, pavement restoration, curb and gutter, Underground Injection Control (UIC) screen wells, and pit drains; sections with vertical concrete walls (Types 1 and 2) can be with or without underdrains (see Attachment 1 at the end of this guide).

Inputs for Initiation Phase Tab

1. **Area within Project to be Treated (input in Square feet):** The total project effective area draining to the right-of-way and into the bioretention cells. If using sizing factor approach, this would be the effective impervious area (from parcels and right-of-way) draining to the bioretention.
2. **Project Bioretention Sizing Factor (input in Percent):** The proportion of the "Area within Project to be Treated" (see #1 above) that will be used to calculate the square footage of proposed bioretention cell bottom area. (i.e. ("Bioretention Cell Bottom Area") / ("Area within Project to be Treated") = "Percent of Treated area to be dedicated to Bottom Area of Bioretention Cell". For example: if the effective impervious area draining to the cells to be treated is 10,000 square feet and the user selects a sizing factor for a cell as 1% then the sum of bioretention bottom area (over multiple cells) will be calculated as 100 square feet.
   NOTE: Sizing factors vary with cell x-section type (graded vs wall), assumptions used to develop the sizing factor and with dimensions of the cell (i.e. bottom width, side slopes). See SPU/WTD for guidance if using a sizing factor vs modeling to size bottom area.
3. **Percentage of Bioretention Cell to be located on streets with a curb (input in percent, 0% by default, which represents a curbless street):** This represents the percentage of bioretention cell length that is on a street with a curb or will have a curb at the completion of improvements. For example, if 50% is selected then it is assumed 50% of cells will be on a road with curb and 50% without. Drain curb cuts are calculated based on road having curb and it is assumed that for every 16 LF (bottom length) of bioretention cell there is one drain curb cut. For roads with no curb the tool will not calculate drain curb cuts. The cost of installing additional curb and gutter due to bulb-outs and curb returns is covered under the Allowance for Indeterminates unless the user decides to add these as discretionary items. For a curbless street, the tool will calculate conveyance piping between cells, include HMA restoration at the width shown in the section, and not include curb/thickened edge along the block. (See Attachment #4).
   NOTE: For curbless streets, if the user intends to use a thickened edge/extruded curb for conveyance and widen the road to standard Neighborhood Yield street width and/or install a conveyance swale between cells, then include Discretionary Items, revise quantities accordingly and adjust conveyance piping calculations.
4. **Will underdrains be required? (Yes/No dropdown, "No" by default):** This field indicates whether or not the GSI project will require underdrains.
   - If "yes" is selected the tool will alert the user to enable a combination of UIC Wells and/or pit drains to infiltrate water collected by the underdrains as needed. An underdrain system will also be tabulated as part of Cell Type 1 and 2 sections.

- If no is selected then an underdrain system will not be tabulated as part of Cell Type 1 and 2 sections, and Cell Type 5 or 9 sections will be used for the calculations.

Note: If the underdrain does not discharge to UIC Screen Well and/or pit drain, then the user should add in discretionary items for how the flow will be discharged, such as flow control structures, drilled drain & appurtenances, connection to PSD, other etc.

5. **What percentage of bioretention cells requires liners? (input in percent, 0% by default):** This number represents the percentage of bottom bioretention cell length that will require a geomembrane liner to separate the bioretention cell section from the underlying soil.
6. **What percentage of bioretention cells requires automatic irrigation? (input in percent, 0% by default):** This number represents the percentage of bottom bioretention cell length that will require an irrigation system to be installed for watering. If set to 0%, then no irrigation will be tabulated, and the budget should be reflected in percent of "hand watering" required (see next item).

   NOTE: The irrigation budget is quantified for the irrigating the total landscape area for the cells not just the bottom length for the first year of the plant establishment phase.
7. **What percentage of bioretention cells requires handwatering for plant establishment? (input in percent, 0% by default):** This number represents the percentage of bottom bioretention cell length that will require hand watering for the first year that could be included under construction. If set to 0%, then the user shall account for automatic irrigation (see #6), or account for a different approach to watering outside of these two options by entering a value into one of the "Discretionary Item" lines near the bottom of the estimate.

   NOTE: The handwatering budget is quantified for watering the total landscape area for the cells not just the bottom length for the first year of the establishment phase. Plant establishment is typically longer than 1-year.
8. **What percentage of bioretention cells will be adjacent to streets with asphalt? (input in percent, 0% by default):** This number represents the percentage of bottom bioretention cell length that is installed along a street with asphalt (keep in mind that total percentage of Asphalt and Cement Concrete pavement should equal 100% - entry fields will change to red if not 100%). If 100% is selected, then the tool will tabulate the hot mix asphalt (HMA) restoration. The tool assumes a typical HMA section of 3 inches Cl. ½" HMA over 6 inches of compacted Type 2 mineral aggregate per COS standard detail 401D. The restoration width is assumed to be 2 feet.
9. **What percentage of bioretention cells will be adjacent to streets with cement concrete pavement? (input in percent, 0% by default):** This number represents the percentage of bottom bioretention cell length that is installed along a street with cement concrete pavement (keep in mind that total percentage of Asphalt and Cement Concrete pavement should equal 100%, (entry fields will change to red if not 100%). The tool assumes a typical residential cement concrete section of 6 inches roadway cement concrete per COS standard detail 401A.

   For example: if 20% is selected then it is assumed that 20% of the bioretention cell area will be adjacent to cement concrete streets and the remaining 80% is on a street with asphalt (HMA). For the Initiation Budget Estimate, the cell sections are assumed to be retrofitted into existing planters and not requiring restoration of the curb/street.

10. **What percentage of bioretention cells require no walls (input in percent, 0% by default):** This number represents the percentage of bioretention cells that will have no vertical walls (See Type 3, 5, 7, or 9 Sections). Keep in mind that the total percentage of no wall, one-wall, and full-wall sections should sum to 100% (wall entry fields will change to red if not 100%). The tool will calculate a total square footage of "Top Footprint Area" for the Designer to double check the feasibility of fitting the proposed design into the actual available space. This Top Footprint Area includes the 16' Cell bottom length, plus 4' of slope area in and out of each end of the Cell, plus 5' of level area at each end between cells in a series, for a total length of 34'; then times the width of 10' between the curb and sidewalk.
    Note: Bioretention cells with graded side slopes (no walls) are preferred for Neighborhood Yield streets.
11. **What percentage of bioretention cells require 1 wall (input in percent, 0% by default):** This number represents the percentage of bioretention cells that will have a single vertical wall (See Type 2 Section). Keep in mind that the total percentage of no wall, one-wall, and full-wall sections should sum to 100% (wall entry fields will change to red if not 100%). The tool will calculate a total square footage of "Top Footprint Area" for the Designer to double check the feasibility of fitting the proposed design into the actual available space. This Top Footprint Area includes the 16' Cell bottom length, plus 4' of slope area in and out of each end of the Cell, plus 5' of level area at each end between cells in a series, for a total length of 34'; then times the width between the curb and new sidewalk.
12. **What percentage of bioretention cells require 4 walls (input in percent, 0% by default):** This number represents the percentage of bioretention cells that will be surrounded by vertical wall (See Cell Type 1 Section). Keep in mind that the total percentage of no wall, one-wall, and full-wall sections should sum to 100% (wall entry fields will change to red if not 100%). The tool will calculate a total square footage of "Top Footprint Area" for the Designer to double check the feasibility of fitting the proposed design into the actual available space. This Top Footprint Area includes the 16' Cell bottom length, plus 0.5' of wall width at each end of the Cell, plus 18' level area outside of the cell (for planting/restoring) cells for a total length of 35'; then times the width between the curb and new sidewalk.
    Note: Cells with vertical sides (4-sided wall planters) are not recommended for Neighborhood Yield streets. Cells with no walls are preferred, or if it fits with site context a single wall section may be used for Neighborhood Yield streets.
13. **Will bioretention cells require UIC Wells? (Yes/No dropdown, no by default):** This field indicates whether or not the GSI project will require UIC wells. If "yes" is selected the tool will alert the user to enable underdrains.
    NOTE: The tool calculates a UIC Screen Well. If other types of UIC wells are used then the user will need to revise the unit cost and include associated infrastructure (gate valves, maintenance access, etc).
14. **How many UIC Wells will be installed? (input number of UIC Wells each):** If UIC Wells dropdown is set yes and this field remains unfilled, the calculator will default to one UIC well per 100 linear feet of bioretention cells (sum of the bottom lengths of bioretention cells in a series).

15. **Will bioretention cells require pit drains? (Yes/No dropdown, no by default):** This field indicates whether or not the GSI project will require pit drains. If "yes" is selected the tool will alert the user to enable underdrains. However, it will not tabulate underdrains. User will need to enter "yes" to "Will underdrains be required?" (see #4) for underdrains to be tabulated in the estimate.
16. **How many pit drains will be installed? (input number of pit Drains each):** If Pit Drains dropdown is set yes and this field remains unfilled that calculator will default to one pit drain per 100 linear feet of bioretention cell (sum of bottom lengths of bioretention cells in a series). Pit drains are quantified as a 20'Lx6'Wx12'D 3-inch minus washed gravel prism (washed gravel is assumed to weigh 1.85 tons per cubic yard placed), a 20' slotted dispersal pipe, and an observation port.
17. **Pit Drain Dimensions (input Length, Width, and Height in feet, assumed to be 20 ft x 6 ft x 12 ft by default):** If the Designer knows the actual volume of pit drains, they can enter the total combined CY of pit drains which would then be used in the calculation in lieu of the estimated number based on the default shape.
18. **Total Number of Intersections to have one corner impacted:** This number represents the number intersections to have one corner impacted by the GSI improvements that will then require ADA curb ramp improvements and intersection restoration defined by pavement type in the intersection's roadway (HMA and/or cement concrete). If one corner of an intersection is impacted by construction then the tool calculates the following allowance: 4 ADA Ramps, 1 type 242 Catch Basin, 20 LF of 8-inch DI CB connection pipe and 40 LF cement concrete curb return replaced (this assumes a 90° corner and a typical radius of 25 feet). Depending on the pavement type that the user selects, the tool will calculate either 5.0 tons HMA Cl. ½" and 8.6 Tons of Type 2 Mineral Aggregate or 27.8 square yards of Roadway Cement Concrete 6 inches (COS Standard Plan 401). Saw cut is considered incidental and part of the Allowance for Indeterminates.

    NOTE: The assumptions in the tool are based in part by the City's Right-of-Way Opening and Restoration Rules when working in Neighborhood Yield streets with sidewalks and curbed streets. If other conditions exist, review City policies for intersection improvements. In addition, if the existing ramps are not impacted and/or the companion ramps meet SDOT standards not requiring replacement, then the user should adjust quantities accordingly.
19. **Total Number of Intersections to have two or more corners impacted:** This number represents the number intersections to have more than one corner impacted by the GSI improvements and further defined by pavement type in the intersection's roadway (HMA and/or cement concrete). This will require a complete rehabilitation of the intersection. The tool calculates the following: 8 ADA Ramps, two COS Type 242 Catch Basin, 40 LF of 8-inch DI CB connection pipe and 160 LF cement concrete curb return replaced (this assumes a 90° corner and a typical radius of 25 feet). Depending on the pavement type that the user selects, the tool will also calculate either 50 tons HMA Cl. ½" and 85.6 Tons of Type 2 Mineral Aggregate or 277.8 square yards of Roadway Cement Concrete 6 inches (COS Standard Plan 401). Saw cut is considered incidental and part of the Allowance for Indeterminates.

NOTE: The assumptions in the tool are based in part by the City's Right-of-Way Opening and Restoration Rules when working in Neighborhood Yield streets with sidewalks. If other conditions exist, review City policies for intersection improvements.

20. **Allowance for Indeterminates Override (Input in percent, 30% by default):** The Allowance for Indeterminates represents the budget of work items that will not be calculated until later design phases (the 30-60-90-Final Design Phases). Typical value for the Allowance for Indeterminates ranges from 25% to 40% and is set at 30% by default. Numbers outside of the noted range shall require justification.
21. **Minimum Allowance for Indeterminates Override (Input in Dollars):** The minimum Allowance for Indeterminates is intended to ensure that the budgets of indeterminate items do not go below a specified level on small projects. This number is by Designer/Planner judgment and is set at $10,000 by default.
22. **Contingency Override (Input in percent, 30% by default)**: Contingencies represent the budget of unexpected work, overruns, changed conditions, and other construction phase occurrences that will change the projects budgets. Typical value for Contingency at this phase range from 25% to 40% and is set at 30% by default. Numbers outside of the noted range shall require justification.
23. **Current City Sales Tax Rate (Input percent, currently 10.1% by default, but subject to change):** This number represents the sales tax rate of the area where the project will be constructed. The default value for the tool is set for Seattle as of May 2017. The local sales tax rate can be looked up at the Washington State Department of Revenue (http://dor.wa.gov/content/findtaxesandrates/salesandusetaxrates/lookupataxrate/).
24. **Rounding Multiple Override (Dollars):** This number is used to round the bottom line of the budget estimate to a set multiple. By default, the number will be rounded to the top three orders of magnitude. This number may be adjusted to show greater precision if the Designer/Planner has greater confidence.

SPU's Option Analysis /WTD's Problem Definition Phase Estimate

The Options Analysis/Problem Definition work sheet is used to develop the second-generation construction budget estimate (hard costs) for a bioretention retrofit project and to allow the estimate user to compare two configuration options for improvements. The basic estimate in the tool assumes that project will require no other additional features and work items beyond those shown in the template cell sections. This sheet has additional parameters that can be set as this phase moves towards completion; producing a more refined budget estimate. The quantities are based upon 12 bioretention cell sections compiled by MIG|SvR (from previous SIP approved GSI projects, schematic sketches from City's Interdepartmental Team meetings in 2013 and other GSI program updates in 2017) and the City's Vegetated Conveyance Swale section (SDOT Standard Plan 294 – issued in 2017). The bioretention cell sections can be customized with liners, with and without underdrains, curb and gutter/curbless streets, and pit drains. The assumptions for the different section types are noted in sketches at the end of this user guide. However, the sections are not to be used as construction details.

See GSI Manual Volume III-Design for resources for developing construction details for GSI projects and City of Seattle Standard Plans 2017.

It should be noted that the bioretention cell Type 1-12 Sections have built in quantities for pavement restoration and curb placement. For example, Type 6 Section shows HMA restoration with new curb and Type 10 Section shows new cement concrete curb on existing concrete panel.

NOTE: On curbless streets to be retrofitted with cells with graded side slope, if the user intends to use a thickened edge/extruded curb for conveyance (which may require widening the road pavement to standard Neighborhood Yield street width) and/or install a conveyance swale or conveyance piping between cells, then include Discretionary Items and determine and adjust quantities associated with the work accordingly.

Inputs for Options Analysis / Problem Definition Tab

The following are the inputs for the Options Analysis-Problem Definition Phase budget estimates. Many of the inputs used are the same as for the Initiation Phase, with modifications described in their description.

1. **Bottom Length in Feet (Input in Linear Feet):** These numbers must be set for each cell type in both options. They represent the cell's bottom length totals of the various cell types used in each option for configuring the GSI improvements.
2. **Liner % (input in percent, 0% by default):** Similar to input 5 in the Initiation Phase. These numbers should be set for each cell type in both options. If any length of sections containing underdrains is selected, the tool will alert the user to enable a combination of UIC Wells and/or pit drains to infiltrate water collected by the underdrains.
3. NOT USED
4. **Will Type 1, 2, 11, and 12 Sections Require Underdrains? (Yes/No dropdown, no by default):** This field indicates whether or not the type 1, 2, 11, and 12 templates will include underdrains in their associated costs. This item must be set for both options.
5. **What percentage of cells will require automatic irrigation (Input in percent, 0% by default):** This is the same as input 6 in the Initiation Phase. This item must be set for both options.
6. **What percentage of bioretention cells requires handwatering for plant establishment? (input in percent, 0% by default):** This is the same as input 7 in the Initiation Phase. This item must be set for both options.
7. **Will bioretention cells require UIC Wells (Yes/No dropdown, no by default):** This is the same as input 13 in the Initiation Phase. This item must be set for both options.
8. **How many UIC Wells will be required (input number of UIC Wells each):** This is the same as input 14 in the Initiation Phase.
9. **Will bioretention cells require pit drains (Yes/No dropdown, no by default):** This is the same as input 15 in the Initiation Phase. This item must be set for both options.

10. **How many pit drains will be required (input number of pit Drains, each)** This is the same as input 16 in the Initiation Phase. This item must be set for both options.
11. **Option 1 and Option 2 Pit Drain Dimensions (input Length, Width, and Height in feet, assumed to be 20 ft x 6 ft x 12 ft by default):** These inputs are the same as input 17 for the Initiation Phase. This item must be set for both options.
12. **Total Number of Intersections to have one corner impacted:** These inputs are the same as input 18 for the Initiation Phase. This must be filled out for both Option 1 and 2.
13. **Total Number of Intersections to have two or more corners impacted:** These inputs are the same as input 19 for the Initiation Phase. This must be filled out for both Option 1 and 2.
14. **Allowance for Indeterminates Override (Input in percent, 25% by default):** Similar to input 20 in the Initiation Phase. Typical value for the Allowance for Indeterminates at this phase range from 15% to 25% and is set at 25% by default. Numbers outside the range shall require justification.
15. **Minimum Allowance for Indeterminates Override (Input in Dollars):** This input is the same as input 21 in the Initiation Phase.
16. **Contingency Override (Input in percent, 20% by default)**: Similar to input 22 in the Initiation Phase. At the Options Analysis/Problem Definition Phase, contingencies are slightly lower from the Initiation Phase due to the increased level of analysis and project development. Typical value for the Allowance for Indeterminates range from 15% to 25% and is set at 20% by default. Numbers outside the range shall require justification.
17. **Current City Sales Tax Rate (Input percent, 10.1% by default):** This input is the same as input 23 in the Initiation Phase.
18. **Rounding Multiple Override:** This input is the same as input 24 in the Initiation Phase.

Computations Work Sheet

The computation worksheet contains all the automated calculations that allow for the rapid generation of the construction budget estimates based upon a minimal set of inputs. The sheet should only be altered under the direction of the tool's original designer or a single designated experienced user from SPU/WTD.

Unit Cost Work Sheet

The unit cost work sheet contains the price information used in the planning level construction budget estimates. The cost data is largely taken from the City of Seattle's cost database with some input from the WSDOT unit bid database (when COS prices not available), average bid prices taken from recent SPU's Ballard and Delridge Projects (completed in 2016) for items not in the City of Seattle cost database, data from WTD's Barton Project (bid in 2013 and completed in 2015) and unit prices developed by MIG|SvR for the estimate.

Action: The Unit Cost Work Sheet should be updated annually to keep the unit prices current. In absence of any specific cost data, it is recommended that the Engineering News Record's Construction Cost Index be used to apply an inflation factor to the unit prices.

Where the City of Seattle's cost database contains more than one bid item price based on a quantity range, the calculation will automatically be based on the appropriate price for the calculated quantity.

This tab also lists a minimum bid amount. If the expanded price of the line item is less than the minimum bid amount, then the minimum bid amount is used. If the user chooses to not use the minimum bid amount they can revise the number to zero or another minimum amount at the user's discretion on this page. However, this should be used with caution given economy of scale in unit prices and should not be done without prior research into the relevant bid prices. The minimum bid price can be disabled on the **Start Here** work sheet.

For example, if "yes" is selected on the **Start Here** page, the project footprint is 300 square feet, and $3/sf is the unit for clearing and grubbing, and $1000 is the minimum bid amount (noted on the **Unit Cost** page), then the minimum bid amount will be $1000. If "no" is selected on the **Start Here,** with same conditions, then the tool is set up to calculate $900.

This tab also includes line items that are not calculated in the tool but may also be used for GSI projects (such as pervious concrete sidewalks, 12" to 16" culvert pipes and extruded curbs). If the user intends to use these line items, they will need to enter in the quantities along with revising other units (such as common excavation for installing the pipe) in the budget estimate tables that are generated on the Initiation Phase and Options Analysis/Problem Definition tabs.

For "Specialty O&M – 1st year" line item, this is to allow the user to define the budgets for certain elements that might occur for O&M in the first year. Such as flow monitoring, flushing, street cleaning, video inspection, bypassing flows in the first year before bringing UIC drilled drains on line or other elements.

The "ROW Encroachment Allowance" line item, is to allow the user to define the budgets for certain elements that may need to be removed/relocated for construction of the bioretention and other improvements. This could include relocation of fences, rockeries, steps, sheds, etc. This line item could also be used for trimming back vegetation that has overgrown and blocked the sidewalk adjacent to the bioretention cell.

Replacement of existing sidewalks: While sidewalks adjacent to cells with walls are accounted for being replaced in the automatic calculations of the tool (see section "General Assumptions for Planning Level Construction Budget Estimates" and Attachment 1 and 4), sidewalks adjacent to graded bioretention cells are assumed to remain. Users will need to adjust sidewalk replacement quantities if the existing sidewalk adjacent to the cell is in poor condition, uplifted, sunken etc. It is recommended users adjust quantities for sidewalk removal and replacement to provide an allowance for this work.

Attachments:

1. "Assumption Notes for Planning Construction Budget Estimate" (Bioretention cell Type 1-12 Sections), compiled by MIG|SvR, dated September 1, 2017.

2. City of Seattle Standard Plans (Issued 2017):
   - 204b – Type 204b Maintenance Hole
   - 242 – Type 242 Catch Basin
   - 294 – Vegetated Conveyance Swale Section
   - 295b – Drain Curb Cut Type 1
   - 401 – Residential Pavement Sections
   - SPU GSI Manual C2 – Neighborhood Curbless, Conveyance – Asphalt Thickened Edge.

3. Exeltech sketch documenting assumptions for automatic calculations and conveyance piping for the tool.

4. MIG|SvR Memorandum, "Updated Assumptions of Select Elements in the GSI Construction Budget Estimating Tool" dated September 22, 2017.

ATTACHMENT 1

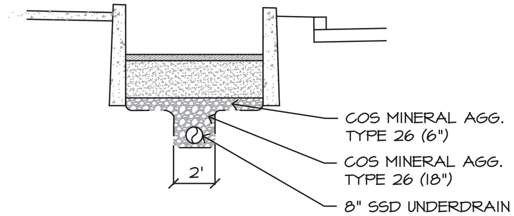
Assumption Notes for Planning Construction Budget Estimate (Bioretention cell Type 1-12 Sections)
Compiled by MIG|SvR

Dated – September 1, 2017.

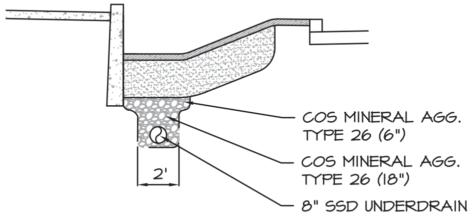
Assumption Notes for Planning* Construction Budget Estimate

*COMMENTS TO USERS:

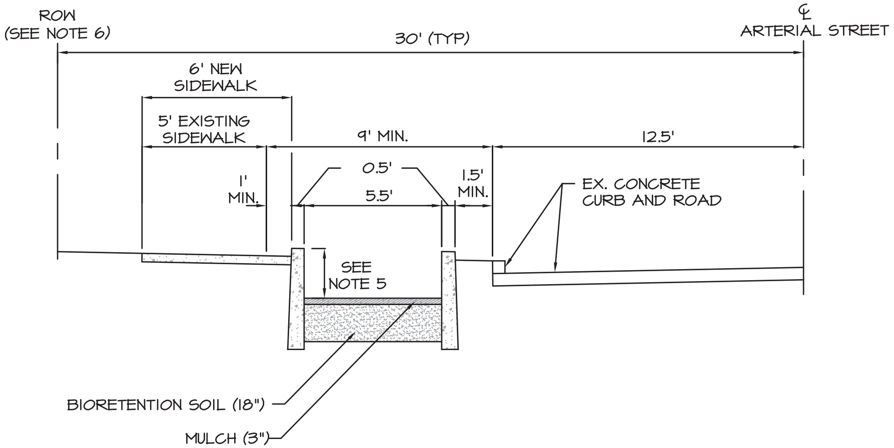
1. "Planning" refers to Initiation Phase and SPU's Option Analysis/WTD's Problem Definition Phase. Not for Design Phase estimating.
2. These sketches are only to document assumptions used for automatic calculations in the Budget Estimate tool. If planter width, section varies from what is shown adjust estimate and quantities accordingly. See Design Volume for design guidance and COS Standard Plans for details.



TYPE 1 WITH UNDERDRAIN

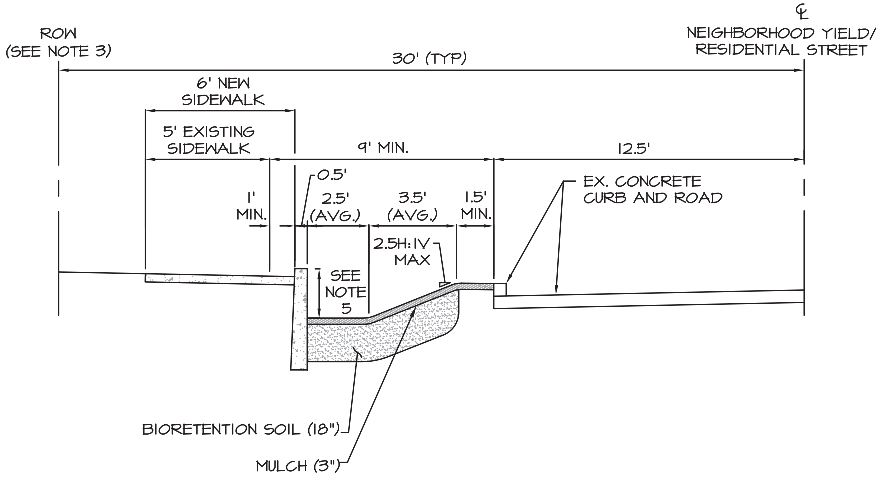


TYPE 2 WITH UNDERDRAIN



TYPE 1 SECTION

BIORETENTION PLANTER WITH 4-WALLS & EXISTING STREET



TYPE 2 SECTION

BIORETENTION PLANTER WITH WALL 1-SIDE & EXISTING STREET

NOTES

1. There are walls on upstream and downstream ends of cell (not shown).
2. Bioretention plantings (not shown) are to be included in costs.
3. Planter with 4 walls is more applicable on corridors/ arterials. It is not recommended for Neighborhood Yield streets.
4. Street trees planted between cells (not shown) are to be included in costs.
5. Depth used for cost assumptions is 22" max but actual average depth is less.
6. Review for encroachments that may need removal or pruning. Encroachments may include fences, steps, walls, etc. It can also include overgrown vegetation blocking sidewalks. User to apply allowance for encroachments.

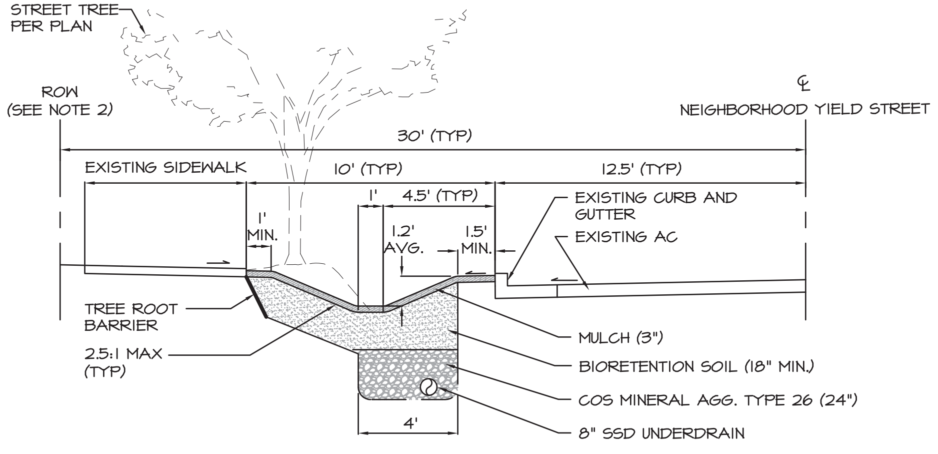
SPU/KC WTD GSI Program Management
Draft - For Internal Discussion
Assumptions for Planning Phase Budget Estimates

Vertical Walls

Rev: Sept. 1, 2017 Page 1 of 6

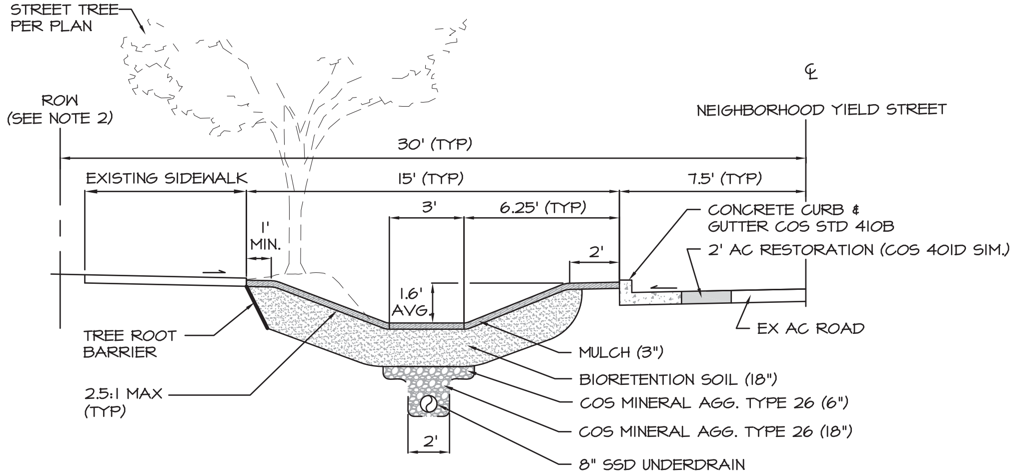
Plotted: Sep 22, 2017 - 3:45:34pm By teresad
File: G:\12c\12034c SPUGSI\Current\Task 2 - Subject Matter Memos\Task 2-4e Cost Memo\SPU Cost Estimating Sections.dwg Layout: 1

Assumption Notes for Planning* Construction Budget Estimate



TYPE 3 SECTION

10' BIORETENTION CELL WITH UNDERDRAIN & EXISTING AC ROAD



TYPE 4 SECTION

15' BIORETENTION CELL WITH UNDERDRAIN, CURB BULB & AC ROAD RESTORATION

*COMMENTS TO USERS:

1. "Planning" refers to Initiation Phase and SPU's Option Analysis/WTD's Problem Definition Phase. Not for Design Phase estimating.
2. These sketches are only to document assumptions used for automatic calculations in the Budget Estimate tool. If planter width, section varies from what is shown adjust estimate and quantities accordingly. See Design Volume for design guidance and COS Standard Plans for details.

NOTES

1. Bioretention plantings (not shown) are to be included in costs.
2. Review for encroachments that may need removal or pruning. Encroachments may include fences, steps, walls, etc. It can also include overgrown vegetation blocking sidewalks. User to apply allowance for encroachments.

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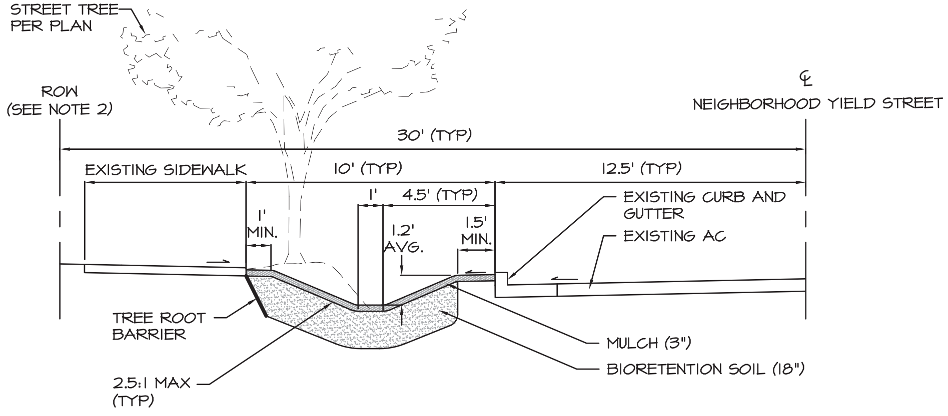
Assumptions for Planning Phase Budget Estimates

Swales with Underdrain at
Asphalt Road

Rev: Sept. 1, 2017 Page 2 of 6

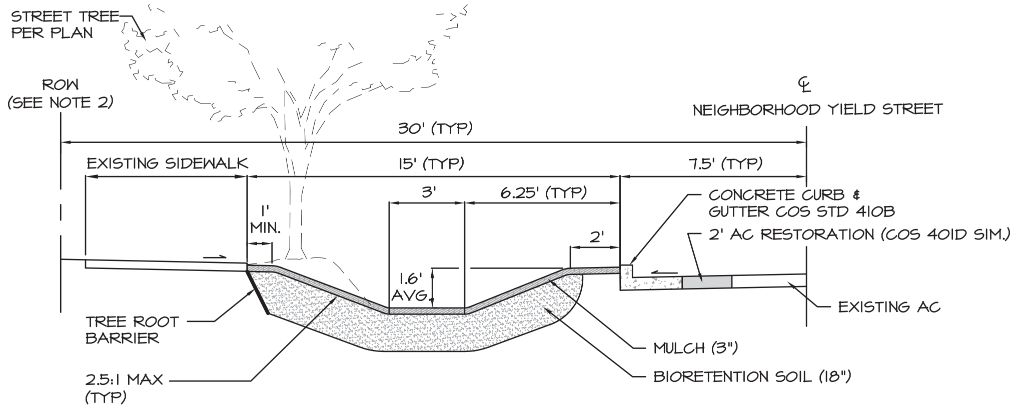
Plotted: Sep 22, 2017 - 3:46:27pm By teresad
File: G:\12c\12034c SPUGSI\Current\Task 2 - Subject Matter Memos\Task 2-4e Cost Memo\SPU Cost Estimating Sections.dwg Layout: 2

Assumption Notes for Planning* Construction Budget Estimate



TYPE 5 SECTION

10' BIORETENTION CELL & EXISTING AC ROAD



TYPE 6 SECTION

15' BIORETENTION CELL WITH CURB BULB & AC ROAD RESTORATION

*COMMENTS TO USERS:

1. "Planning" refers to Initiation Phase and SPU's Option Analysis/WTD's Problem Definition Phase. Not for Design Phase estimating.
2. These sketches are only to document assumptions used for automatic calculations in the Budget Estimate tool. If planter width, section varies from what is shown adjust estimate and quantities accordingly. See Design Volume for design guidance and COS Standard Plans for details.

NOTES

1. Bioretention plantings (not shown) are to be included in costs.
2. Review for encroachments that may need removal or pruning. Encroachments may include fences, steps, walls, etc. It can also include overgrown vegetation blocking sidewalks. User to apply allowance for encroachments.

Seattle Public Utilities

King County
Department of Natural Resources and Parks
Wastewater Treatment Division

SPU/KC WTD GSI Program Management
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Assumptions for Planning Phase Budget Estimates
Swale without Underdrain at
Asphalt Road
Rev: Sept. 1, 2017

Plotted: Sep 22, 2017 - 3:49:19pm By teresad
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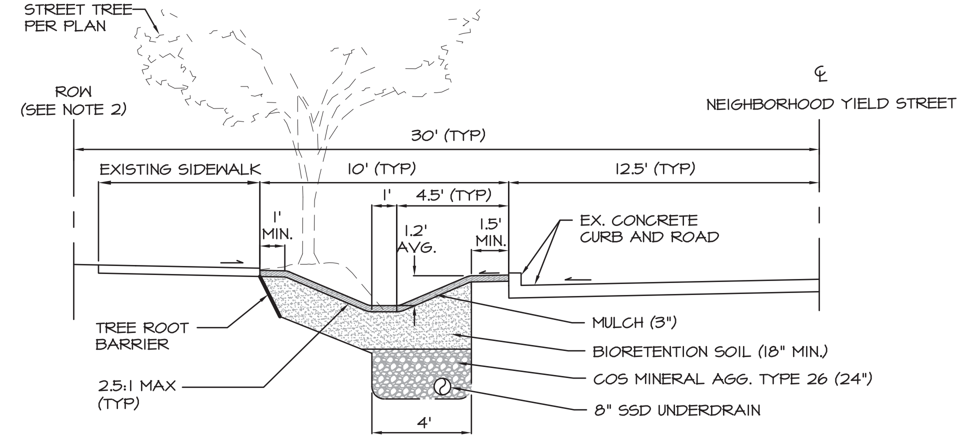
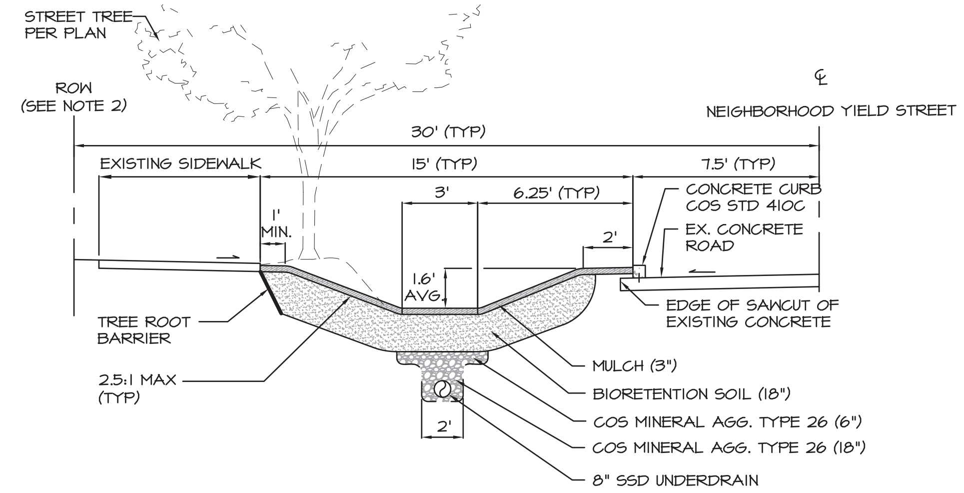
Assumption Notes for Planning* Construction Budget Estimate



TYPE 7 SECTION

10' BIORETENTION CELL WITH UNDERDRAIN & EXISTING CONCRETE ROAD



TYPE 8 SECTION

15' BIORETENTION CELL WITH UNDERDRAIN, CURB BULB & CONCRETE ROAD RESTORATION

*COMMENTS TO USERS:

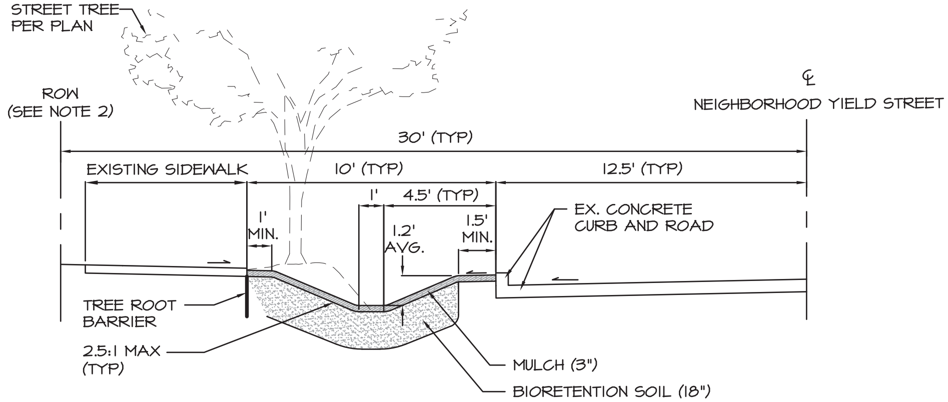
1. "Planning" refers to Initiation Phase and SPU's Option Analysis/WTD's Problem Definition Phase. Not for Design Phase estimating.
2. These sketches are only to document assumptions used for automatic calculations in the Budget Estimate tool. If planter width, section varies from what is shown adjust estimate and quantities accordingly. See Design Volume for design guidance and COS Standard Plans for details.

NOTES

1. Bioretention plantings (not shown) are to be included in costs.
2. Review for encroachments that may need removal or pruning. Encroachments may include fences, steps, walls, etc. It can also include overgrown vegetation blocking sidewalks. User to apply allowance for encroachments.

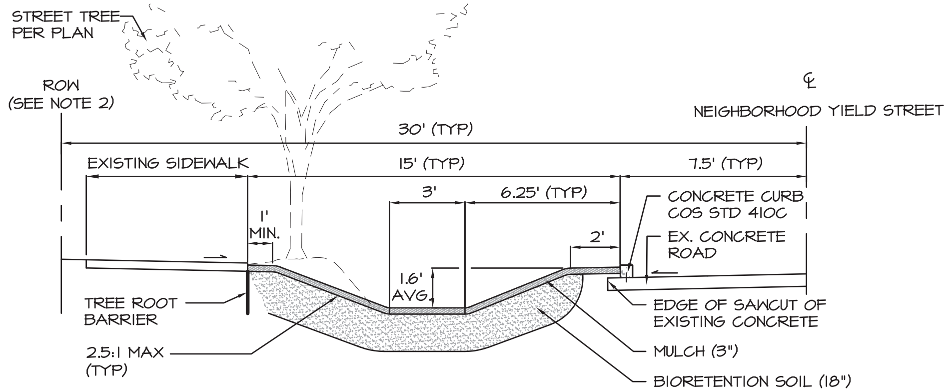
SPU/KC WTD GSI Program Management
Draft – For Internal Discussion
Assumptions for Planning Phase Budget Estimates
Swales with Underdrain at
Concrete Road
Rev: Sept. 1, 2017

Assumption Notes for Planning* Construction Budget Estimate



<u>TYPE 9 SECTION</u>

10' BIORETENTION CELL & EXISTING CONCRETE ROAD



<u>TYPE 10 SECTION</u>

15' BIORETENTION CELL WITH CURB BULB & CONCRETE ROAD RESTORATION

*<u>COMMENTS TO USERS:</u>

1. "Planning" refers to Initiation Phase and SPU's Option Analysis/WTD's Problem Definition Phase. Not for Design Phase estimating.
2. These sketches are only to document assumptions used for automatic calculations in the Budget Estimate tool. If planter width, section varies from what is shown adjust estimate and quantities accordingly. See Design Volume for design guidance and COS Standard Plans for details.

<u>NOTES</u>

1. Bioretention plantings (not shown) are to be included in costs.
2. Review for encroachments that may need removal or pruning. Encroachments may include fences, steps, walls, etc. It can also include overgrown vegetation blocking sidewalks. User to apply allowance for encroachments.

Seattle Public Utilities

King County
Department of Natural Resources and Parks
Wastewater Treatment Division

SPU/KC WTD GSI Program Management
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Assumptions for Planning Phase Budget Estimates

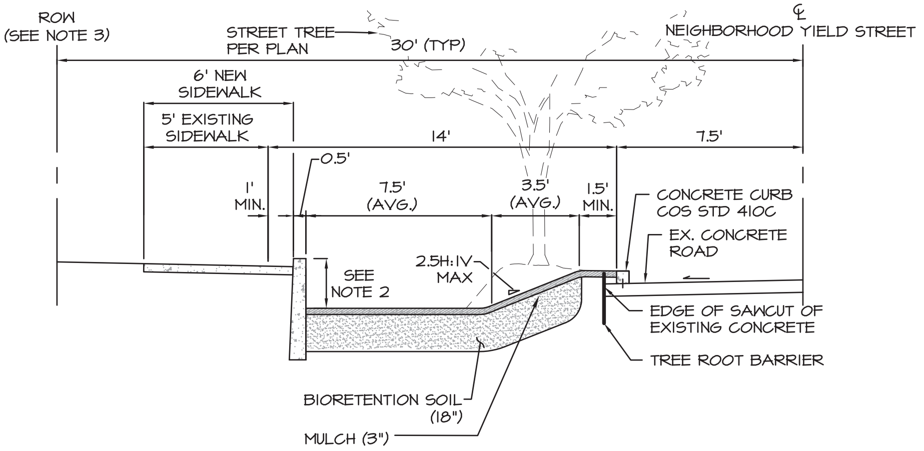
Swale without Underdrain at
Concrete Road

MIG SvR

Rev: Sept. 1, 2017

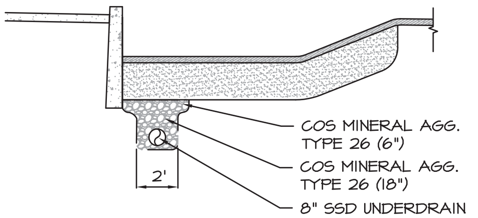
Plotted: Sep 22, 2017 - 3:50:59pm By teresad
File: G:\12c\12034c SPUGSI\Current\Task 2 - Subject Matter Memos\Task 2-4e Cost Memo\SPU Cost Estimating Sections.dwg Layout: 5

Assumption Notes for Planning* Construction Budget Estimate

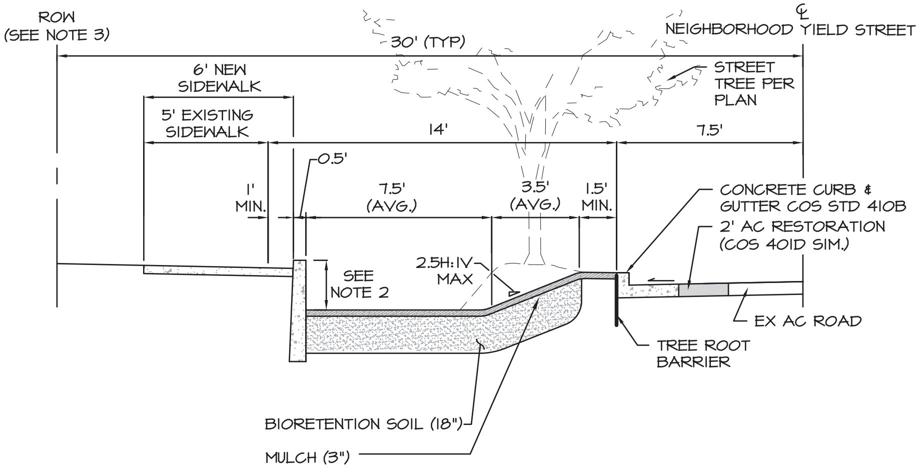


TYPE 11 SECTION

14' BIORETENTION PLANTER WITH WALL 1-SIDE, CURB BULB & CONCRETE ROAD RESTORATION



TYPE 11 & 12 WITH UNDERDRAIN



TYPE 12 SECTION

14' BIORETENTION PLANTER WITH WALL 1-SIDE, CURB BULB & AC ROAD RESTORATION

*COMMENTS TO USERS:

1. "Planning" refers to Initiation Phase and SPU's Option Analysis/WTD's Problem Definition Phase. Not for Design Phase estimating.
2. These sketches are only to document assumptions used for automatic calculations in the Budget Estimate tool. If planter width, section varies from what is shown adjust estimate and quantities accordingly. See Design Volume for design guidance and COS Standard Plans for details.

NOTES

1. Bioretention plantings (not shown) are to be included in costs.
2. Depth used for cost assumption is 22" max. but actual average depth for design is less.
3. Review for encroachments that may need removal or pruning. Encroachments may include fences, steps, walls, etc. It can also include overgrown vegetation blocking sidewalks. User to apply allowance for encroachments.

Seattle Public Utilities

King County
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Wastewater Treatment Division

SPU/KC WTD GSI Program Management
Draft - For Internal Discussion
Assumptions for Planing Phase Budget Estimates
Swale without Underdrain at
Concrete Road
M I G
SvR
Rev: Sept. 1, 2017

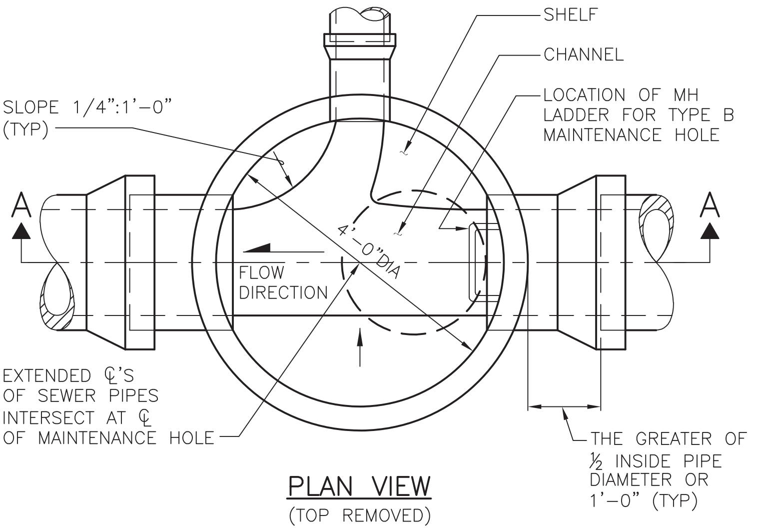
Plotted: Sep 22, 2017 - 3:51:34pm By teresad
File: G:\12c\12034c SPUGSI\Current\Task 2 - Subject Matter Memos\Task 2-4e Cost Memo\SPU Cost Estimating Sections.dwg Layout: 6

ATTACHMENT 2

City of Seattle Standard Plans (Issued 2017)

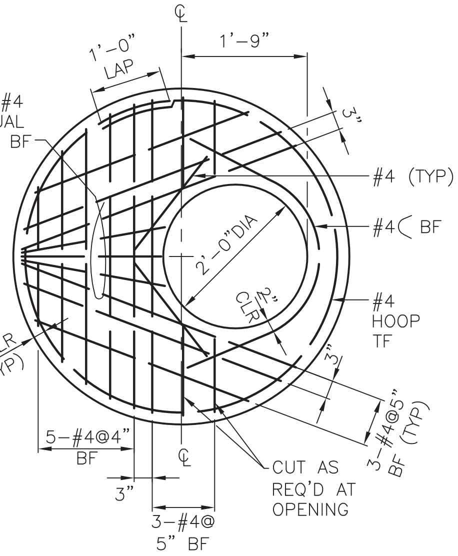
- 204b – Type 204b Maintenance Hole
- 242 – Type 242 Catch Basin
- 294 – Vegetated Conveyance Swale Section
- 295b – Drain Curb Cut Type 1
- 401 – Residential Pavement Sections
- SPU GSI Manual C2 – Neighborhood Curbless, Conveyance – Asphalt Thickened Edge.

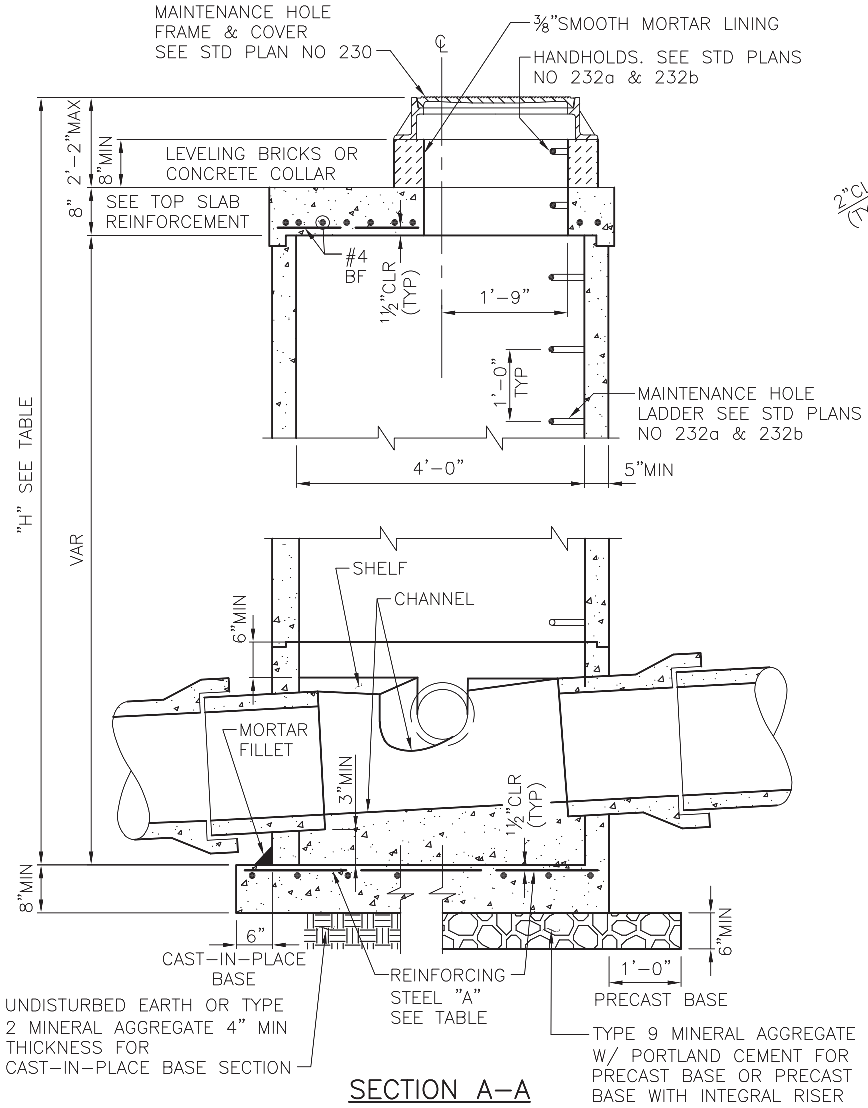
REV DATE: FEB 2016



PLAN VIEW
(TOP REMOVED)

"H"	REINFORCING STEEL "A" MIN. SQ IN/FT, TOP FACE, IN EACH DIRECTION	
	PRECAST BASE	CAST-IN-PLACE BASE
20' MAX	0.25	0.17
30' MAX	0.31	0.22
40' MAX	0.36	0.25





SECTION A–A

NOTES:

1. MATERIALS: CONCRETE–CLASS 4000; REINFORCING STEEL–ASTM A615 GRADE 60 MIN; CHANNEL AND SHELF MATERIAL – CONCRETE CLASS 3000.
2. PRECAST MAINTENANCE HOLE COMPONENTS MUST CONFORM TO ASTM C 478. JOINTS BETWEEN PRECAST COMPONENTS MUST BE RUBBER GASKETED CONFORMING TO ASTM C 443.
3. MINIMUM REQUIRED SOIL BEARING = 3,000 LBS/SQ FT
4. MAX HOLE SIZE MUST BE OD OF PIPE PLUS 5 IN. MIN HOLE SIZE MUST BE OD OF PIPE PLUS 3 IN. MIN CLEAR DISTANCE BETWEEN HOLES IS 8 IN.

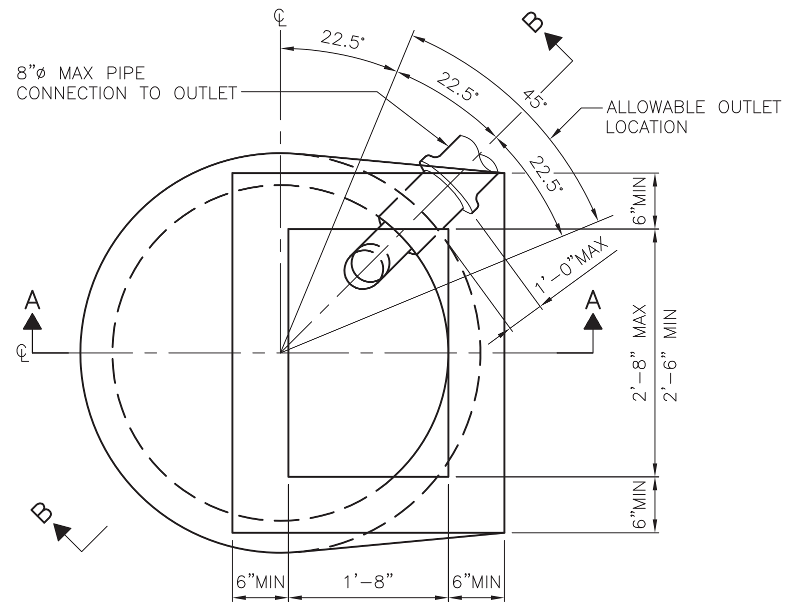
REF STD SPEC SEC 7-05

City of Seattle

NOT TO SCALE

TYPE 204b MAINTENANCE HOLE

REV DATE: AUG 2014

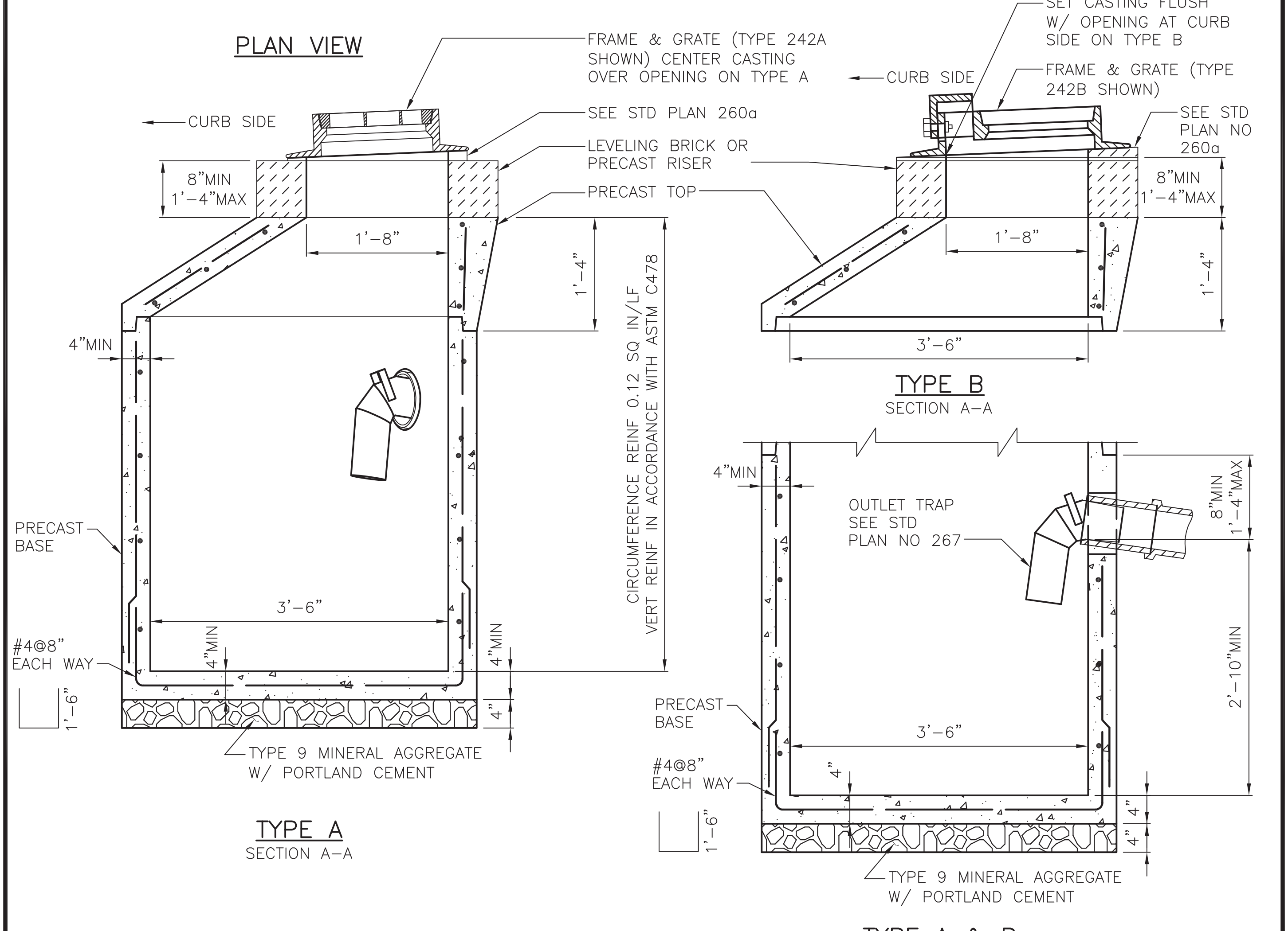


PLAN VIEW

CB TYPE	CASTING		
	FRAME	GRATE	HOOD
A	NO 262	NO 265	NONE
B	NO 263A	NO 265	NO 263A
C	NO 263A	NO 265	NO 263B

NOTES:

1. MATERIAL: CONCRETE: CLASS 4000
   REINFORCING STEEL: ASTM A 615 GR 60
2. INSTALL & LOCATE PER STD PLANS NO 260 & 261
3. OUTLET TRAP TO BE LOCATED DIRECTLY BELOW FRAME AND GRATE
4. USE OF LEVELING BRICKS MUST BE RUNNING BOND PATTERN WITH ¼ TO ½ GROUT IN BETWEEN BRICKS.



TYPE A
SECTION A–A

TYPE B
SECTION A–A

TYPE A & B
SECTION B–B

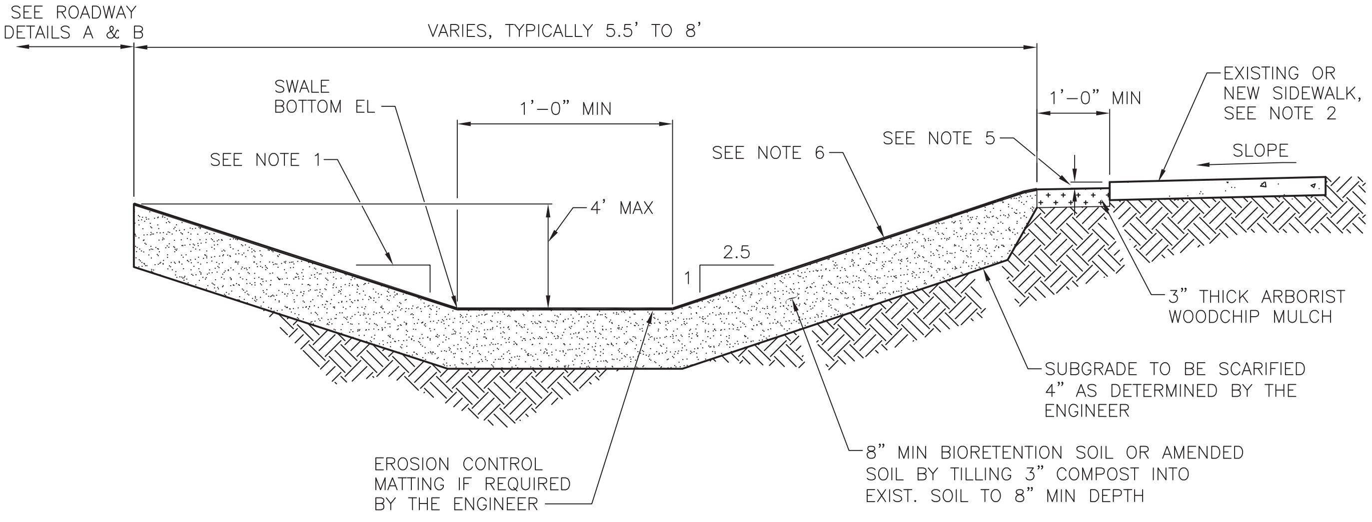
REF STD SPEC SEC 7-05

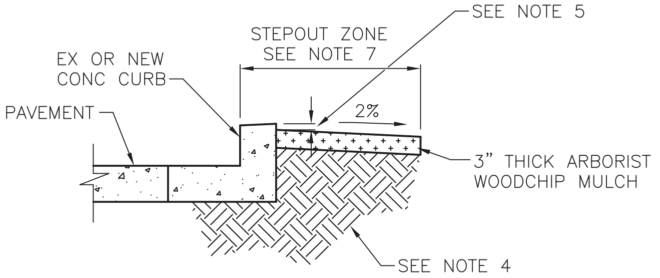
City of Seattle

NOT TO SCALE

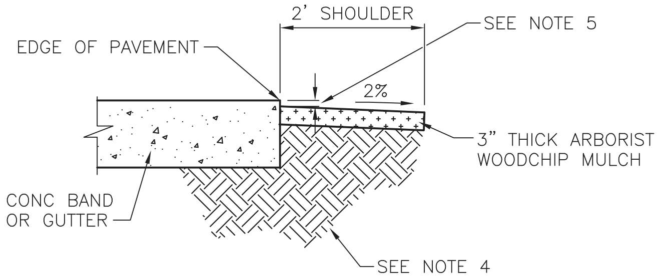
TYPE 242 CATCH BASIN

REV DATE: DEC 2015





DETAIL A
CURBED ROADWAY
(ADJACENT TO PARKING ZONE)



DETAIL B
CURBLESS ROADWAY

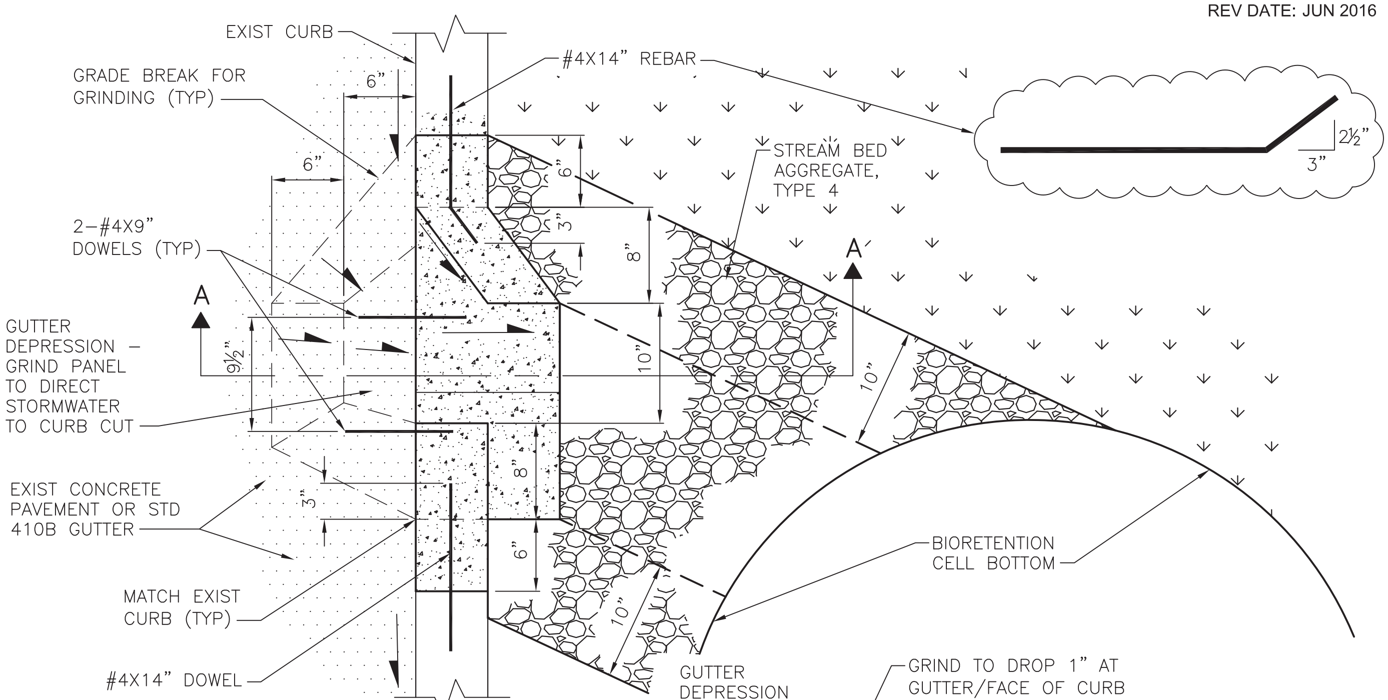
NOTES:

1. TYPICAL MAXIMUM SLOPE ALLOWED IS 2.5H=1V, 3H=1V MAX WHEN WITHIN 50-FEET OF INTERSECTIONS OR CURBLESS ROADWAY.
2. CONVEYANCE SWALE OVERFLOW ELEVATIONS MUST BE SET BELOW SIDEWALK ELEVATION.
3. LONGITUDINAL SLOPE GREATER THAN OR EQUAL TO 4%, CHECK DAM REQUIRED.
4. UNDISTURBED NATIVE SOIL OR APPROVED SOIL COMPACTED TO 95% DENSITY.
5. PROVIDE MIN ONE INCH GAP BETWEEN TOP OF WALKS, CURBS, PAVEMENTS AND DRIVEWAYS AND TOP OF TREATMENT LAYER.
6. PLANTING PER APPROVED LANDSCAPE PLAN.
7. FACE OF CURB TO TOP OF SLOPE MUST BE MIN 2'-0" FOR NON-MAJOR ARTERIAL STREETS, MIN 4'-0" FOR MAJOR ARTERIAL STREETS.

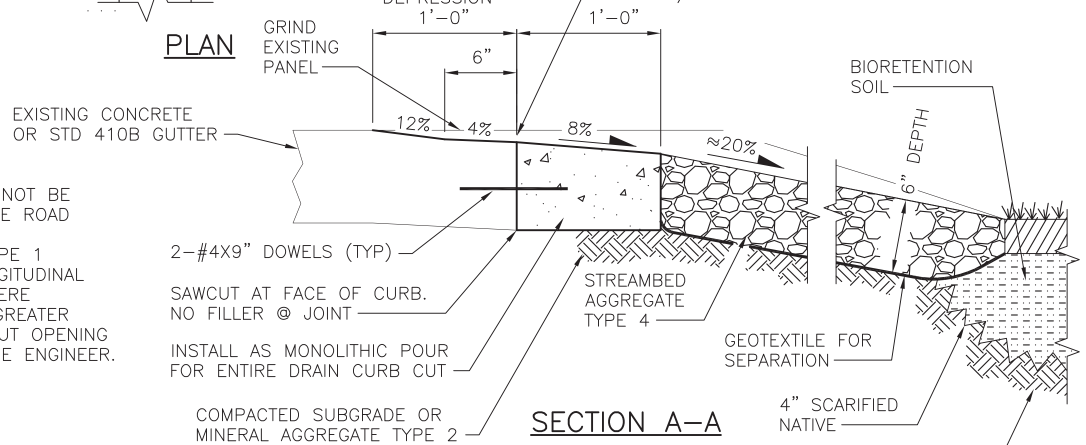
REF STD SPEC SEC 7-21

City of Seattle	NOT TO SCALE	VEGETATED CONVEYANCE SWALE (NOT FOR WATER QUALITY TREATMENT)

REV DATE: JUN 2016



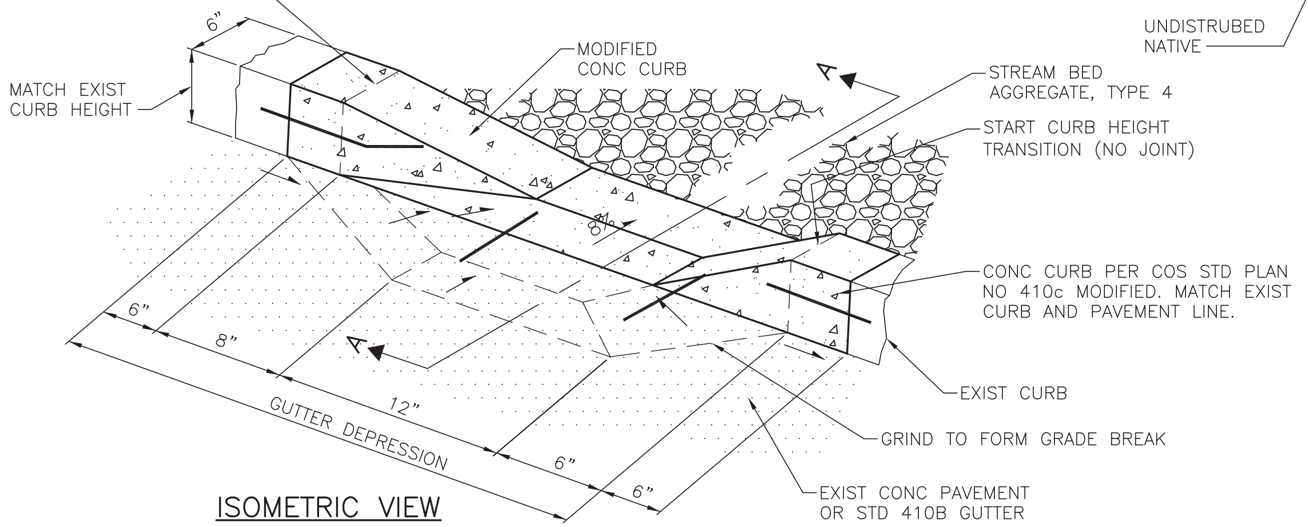
PLAN



SECTION A–A

NOTES:

1. DRAIN CURB CUTS MUST NOT BE LOCATED WITHIN CONCRETE ROAD PANEL JOINT.
2. USE DRAIN CURB CUT TYPE 1 WHERE GUTTER LINE LONGITUDINAL SLOPE IS 0 TO 5%. WHERE LONGITUDINAL SLOPE IS GREATER THAN 5%, DRAIN CURB CUT OPENING WILL BE DESIGNED BY THE ENGINEER.



ISOMETRIC VIEW

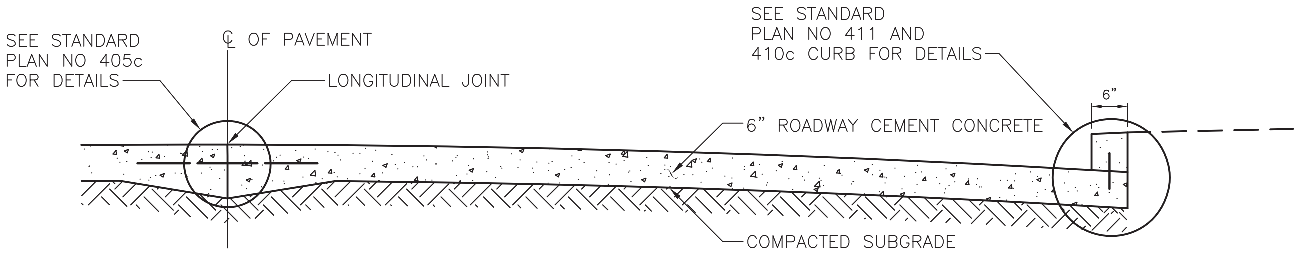
REF STD SPEC SEC 7-21, 9-03

City of Seattle

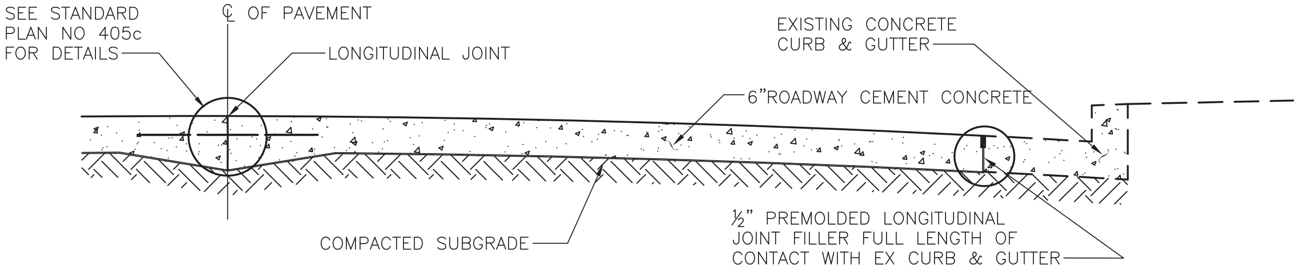
NOT TO SCALE

DRAIN CURB CUT TYPE 1

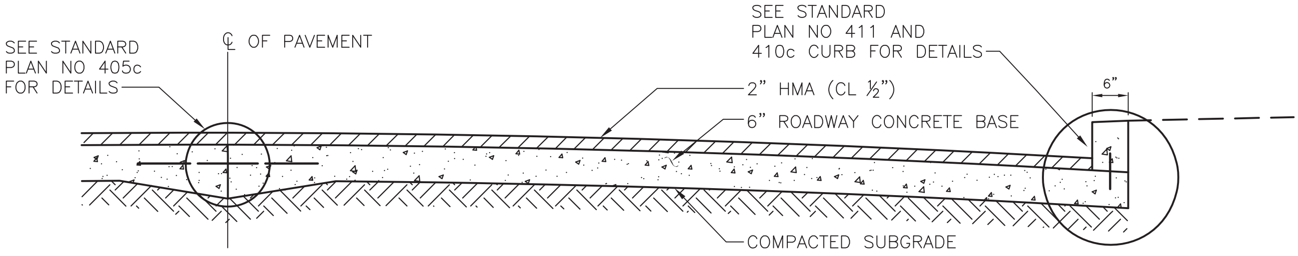
REV DATE: DEC 2013



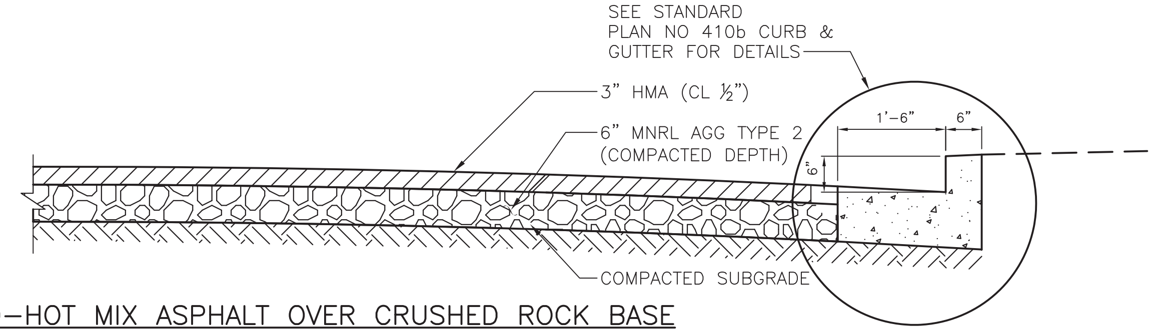
401A–CEMENT CONCRETE PAVEMENT WITH INTEGRAL CURB



401B–CEMENT CONCRETE PAVEMENT WITH EXISTING CURB & GUTTER



401C–HOT MIX ASPHALT ON CEMENT CONCRETE BASE



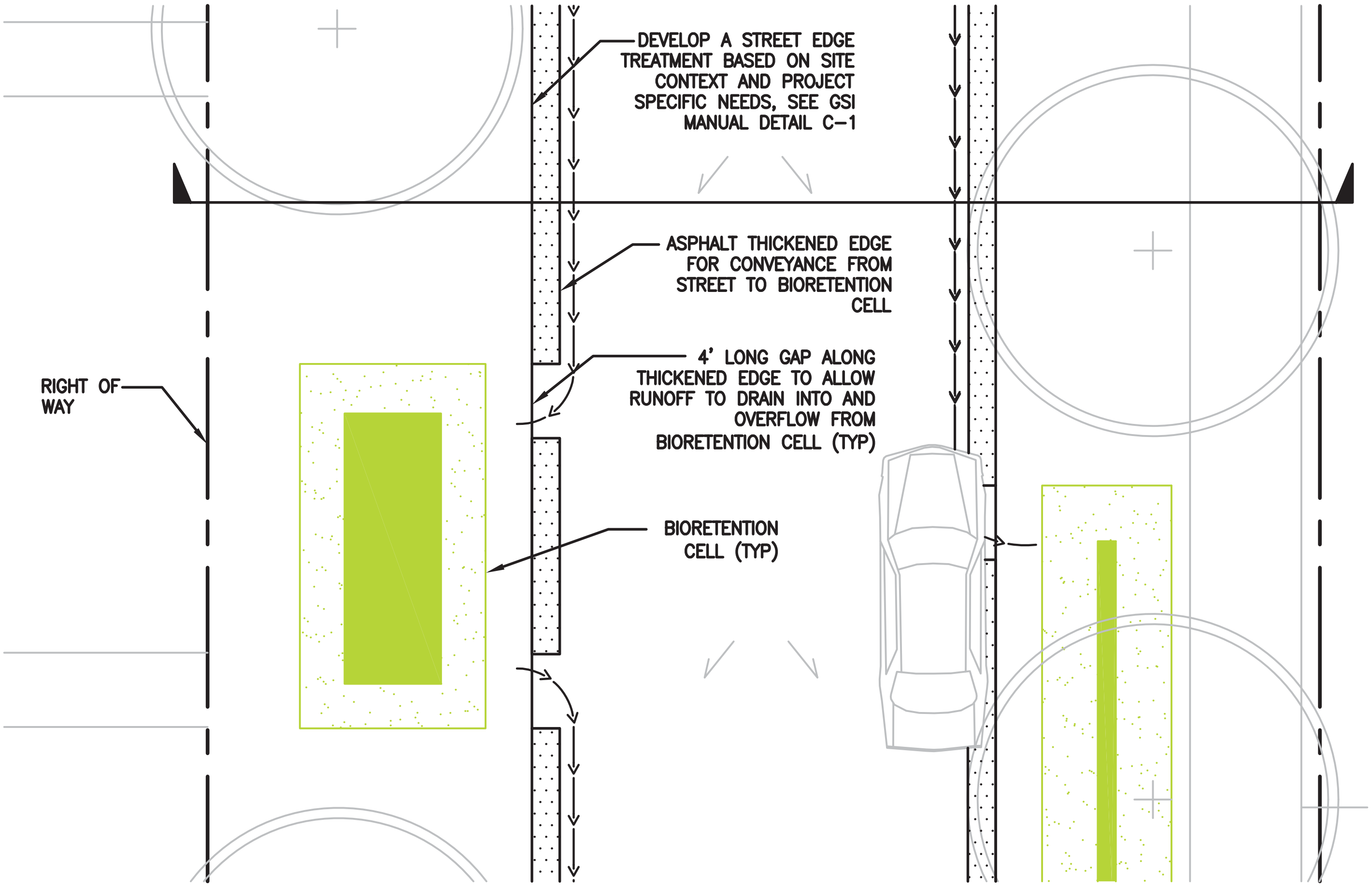
401D–HOT MIX ASPHALT OVER CRUSHED ROCK BASE

HMA DESIGN CRITERIA:

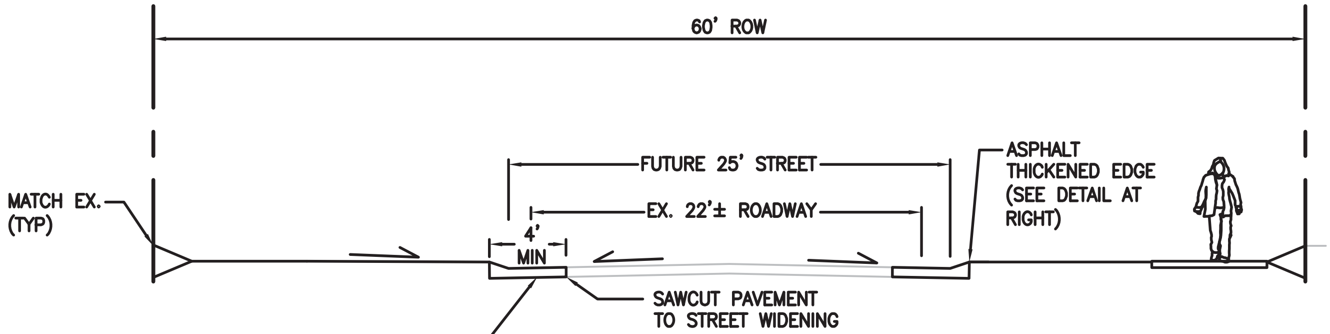
1. 3 MILLION ESAL'S UNLESS OTHERWISE SPECIFIED IN CONTRACT DOCUMENTS
2. ASPHALT PG 64–22 UNLESS OTHERWISE SPECIFIED IN CONTRACT DOCUMENTS
3. WARM MIX ASPHALT MAY BE USED IN PLACE OF HMA WHERE SHOWN ON THE DRAWINGS

REF STD SPEC SEC 4-04, 5-04, 5-05, 8-04

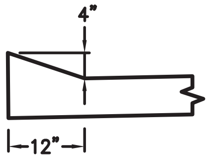
City of Seattle	NOT TO SCALE	RESIDENTIAL PAVEMENT SECTIONS



PLAN



SECTION



DETAIL

Plotted: Feb 15, 2017 – 9:23:03am By nathanp
File: G:\12c\12034c SPUGSI\Current\SPU_C–02–04_CONVEY AND STREET EDGE.dwg Layout: C2

Prepared by: MIG I SvR

Seattle Public Utilities
King County Department of Natural Resources and Parks Wastewater Treatment Division

Green Stormwater Infrastructure in Seattle

www.700MillionGallons.org

Working Together to Protect our Waterways

NEIGHBORHOOD CURBLESS,
CONVEYANCE -
ASPHALT THICKENED EDGE

FEBRUARY 15, 2017 NOT TO SCALE

GSI MANUAL

C-2

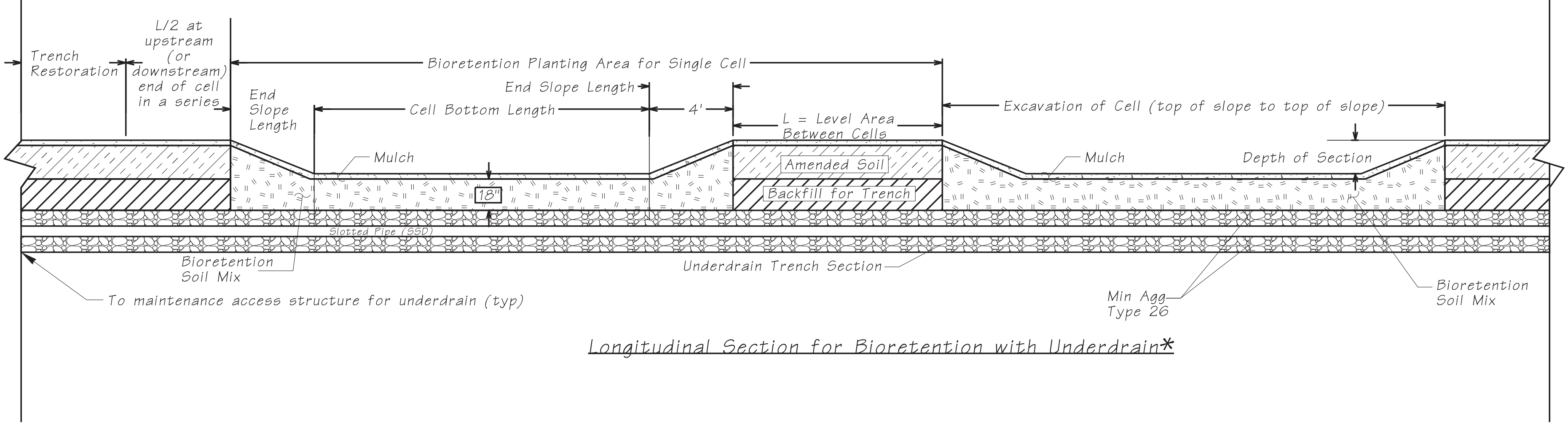
ATTACHMENT 3

Sketch documenting assumptions for automatic calculations and conveyance piping for the tool.

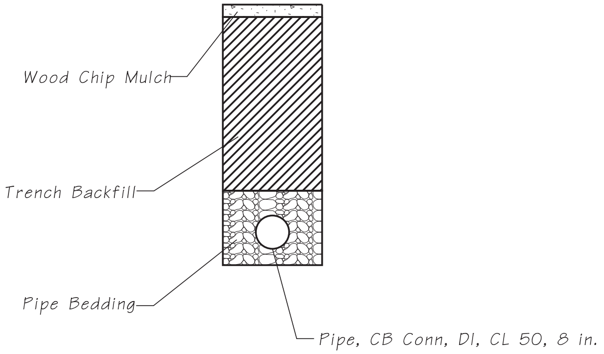
Prepared by Exeltech

Dated – January 25, 2018.

Assumptions for Automatic Calculation in Budget Tool



Longitudinal Section for Bioretention with Underdrain*



Conveyance Pipe Between Cells

*Note to users: This sketch is to document assumptions used in the tool when the number of cells, number of blocks for implementing GSI, etc. are not known. It is not a construction detail. If the project team has developed the design concept further (i.e. size and layout of cells on a specific block), then user shall adjust quantities automatically calculated in the tool.

SPU/KC WTD GSI Program Management

By Exeltech

1/25/2018

ATTACHMENT 4

Updated Assumptions of Select Elements in the GSI Construction Budget Estimating Tool
Prepared by MIG|SvR
Dated – September 22, 2017.

MEMORANDUM

DATE: December 5, 2013 Revised March 2, 2017, September 22, 2017

TO: Leroy Slemmer, Exeltech Consulting Inc

FROM: Kathryn Gwilym, PE, MIG l SvR
Peg Staeheli, PLA, MIG | SvR

RE: **Updated Assumptions of Select Elements in the GSI Construction Budget Estimating Tool**
Task #2 – Joint Procedures and Tools
Subtask # 2.6.2 – Cost Tool Update

This memorandum is to document assumptions for various items for incorporating into the budget estimating tool for the two planning phases: 1) Initiation Phase and 2) Seattle Public Utility's (SPU) Option Analysis Phase / King County Wastewater Treatment Division's (WTD) Problem Definition Phase of a green stormwater infrastructure (GSI) capital project. The tool is focused on bioretention systems retrofitted into existing Neighborhood Yield and Neighborhood Curbless street types (See Seattle's Street Illustrated Right-of-Way Improvement Manual for street types).

WTD's Barton CSO Control project with GSI (Barton project) (bid in 2013) was used as an example for the initial starting point for some of the items and correlating bottom area of a cell to number of streets (when the # of streets are not known at the early planning phase). For the 2017 update we also looked at COS 2016 Unit Costs and 2015 bid tabs from SPU's Delridge and Ballard Phase 2 GSI projects.

If you have questions after review of this for incorporating into the tool, please give us a call.

(Note: Items marked with an asterisk * next to the number in the first column reflect updated assumptions to use in the update for the tool for March 2017 and ** for the September 2017 update).

NO	Element	Issue to resolve	Assumption for Budget Estimating Tool for Initiation & SPU's Options Analysis/WTD's Problem Definition Phases
1	Conveyance Piping between bioretention cells on curbless streets	Determine length of conveyance piping as a percentage of bottom length of bioretention cell.	If conveyance piping is planned on GSI project for an informal street (w/o curb & gutter), it is assumed the layout of the bioretention cells would be consolidated. The conveyance piping would be to connect the cells. We compared the length between cells with the cell bottom length for multiple street layouts that had consolidated cells. The average length of conveyance piping to bottom length of bioretention cell was **90%** (e.g. If 100 lf of bottom bioretention cell, then the conveyance piping is estimated at 90 lf.). Assume conveyance piping is 8" diameter DI CL 52 pipe.
2	Underdrain Pipe length (below & between bioretention cells)	Determine length of underdrain as a percentage of bottom length of bioretention cell.	The underdrain pipe is below the bioretention and between the cells. We compared several street designs for Barton and the average percentage of Underdrain pipe length compared to bottom length of cell is **220% or 2.2 feet of underdrain pipe for every foot of bottom cell length..** (e.g. If 100 lf of bottom bioretention length then 220 lf of underdrain piping)

NO	Element	Issue to resolve	Assumption for Budget Estimating Tool for Initiation & SPU's Options Analysis/WTD's Problem Definition Phases
3**	Landscape Area for Bioretention Plantings	Bioretention planting area is to include the end slopes of a cell and the level crossings between cells. Determine the length of a landscape area as a percentage of the bottom length of bioretention cell. Total area is then multiplied by planter width.	Bioretention planting area is to be the full planter width (back of curb to face of sidewalk) times length of landscape zone. Landscape area for bioretention plantings includes bottom of cell, side slope at each end and level crossing (transition zone at top of swale). For cells with graded side slopes, for the tool assume each cell has an average bottom cell length of 16' (from Barton), 10' level area to be planted, slope transition at each end of 4'. The total landscape area per cell is the planter width times 34'. For cells with one side of a vertical wall, for the tool assume each cell has an average bottom cell length of 16', slope transition at each end of 4', and 10' level area outside of top of slope. The total landscape area per cell is the planter width times 34'. For cells with vertical wall on all four sides, for the tool assume each cell has an average bottom cell length of 16' and 18' length outside of the cell that is to be planted between cells/restored for a total length of 34' (not including the cell end walls). Assume the landscape area is the planter width (minus the width of the walls).
4*	Bioretention Plantings unit price	Determine the unit price for bioretention plantings including new street trees to be used for the cost estimating tool for the Options Analysis phase.	Using the landscape plans developed for Barton that used graded side slope cells and factoring in costs for trees, shrubs, groundcovers, emergents, bulbs, plant layout, and review of 2016 COS unit prices we estimate unit price at **$10.75/sf of landscape area** (includes swale footprint and level areas between cells). Cost was increased in this 2017 update to include a mix of 25% gallon plants and 75% emergent 10 cu inch plugs for the bottoms and sides of the cells.
5*	Irrigation System Unit Price and Area	Determine unit price for irrigating landscape area and area for irrigating.	If an irrigation system will be installed for plant establishment during the first few years and used during drought periods, based on the research that was conducted for WTD's Barton's design estimates and reviewing other MIG|SvR projects and COS 2016 unit prices, we estimate irrigation cost to be **$1.05/sf of irrigated area**. Irrigation area is the landscape area that is determined in #3. Meter and street restoration associated with the meter are separately estimated in #6. Irrigation cost assumes the cells are grouped together (e.g. congregated at the downstream end of a block rather than spread out). Based on discussions with SPU, typically an irrigation system will not be installed and so the percentage of bioretention to have irrigation would be no. We recommend the default be set to 0% irrigation system.

NO	Element	Issue to resolve	Assumption for Budget Estimating Tool for Initiation & SPU's Options Analysis/WTD's Problem Definition Phases
6 *	Irrigation Meter	Determine Irrigation Meter Costs and assumption for # of units	If there is irrigation, it is assumed there will be one ¾" irrigation meter for each street. To convert bioretention area to # of meters when # of streets is unknown, we reviewed the designs for Barton which had approximately 2500 sf of irrigation area per street (~660' intersection to intersection). Using this as a basis, assume **one ¾" meter** for every 2500 sf of irrigated area (calculated in #5). (Total irrigated area in sf)/(2500sf)=# of meters SPU Water Service Standard, Connections & Charges notes $2,558 for Installation and $1,063 for connection for total meter cost of **$3,621** (as of data posted on SPU website 9-18-2017). This does not include pavement restoration. For **pavement restoration** associated with new water meter connection we assume it is a concrete panel (10'x12.5') using SPU unit costs.
6A **	Hand Watering – 1st year	Determine unit price for hand watering.	This line item is for hand watering from a water truck (as opposed to automatic irrigation) the bioretention facility for first year of plant establishment that might be under the construction contract or done by others. Cost includes labor, equipment and water. Cost is $**2.00/sf** based on irrigation approach & comparison analysis conducted by WTD for Barton (see TM in Appendix J of GSI Manual Volume III - Design), inflation and COS water rates posted as of 3/2/2017 (2017 rates). Area to be watered is the landscape area that is determined in #3.
6B *	Irrigating – 1st year	Determine unit price for irrigating	This line item is for automatic irrigation (as opposed to hand watering) the bioretention facility for first year of plant establishment that might be under the construction contract or done by others. Cost is **$ .40/sf** based on COS water rates posted as of 3/2/2017 (2017 rates) and for the amount of water typically used. Area to be irrigated is the landscape area that is determined in #3.

NO	Element	Issue to resolve	Assumption for Budget Estimating Tool for Initiation & SPU’s Options Analysis/WTD’s Problem Definition Phases
7*	Bioretention soil Mix	Unit price for COS bioretention soil mix for two quantity categories.	We recommend using current COS Unit costs for the planning level budget estimating tool. *Background Notes:* In 2013, we contacted two main suppliers (Cedar Grove and Pacific Topsoil) in our area on material costs delivered (not installed) and they noted a range of X =10 CY $31 & $37.75/cy X= 100 CY $30 & $30.75/cy Adding in installation costs we would expect a range of $62 to $75.50/cy. COS 2012 Unit costs noted $75/cy (which includes installation). COS 2016 unit costs note range of $80 to $90/cy depending upon volume above or below 20 cubic yards. Delridge’s 2015 unit price from bidders ranged from $65 to $85/cy for volume over 20 cy.
8**	Intersection improvement assumptions	Determine assumptions for estimating intersection restoration if GSI improvements expand into a curb return. This would apply to the Options Analysis/Problem Definition phase.	For cost estimating tool, assume intersection improvements are on a Neighborhood Yield street (25’ wide). **Add the following questions** to the Options Analysis/Problem Definition phase. *Will the project require restoration at an intersection?* *Total number of intersections to have one corner/curb return impacted is* _____ *intersections.* *Total number of intersections to have two or more corners/curb returns impacted is* ______ *intersections.* **Assumptions to use for automatic calculations costing:** If one curbed corner/curb return is impacted by construction then the tool is to assume: • Total of four ADA ramps will be installed (2 at corner and companion for each) • Curb at curb return is replaced • Two full concrete panels/Asphalt in street is being replaced 10’x25 total’ • Catch basin is replaced with COS Type 242 If two or more corners/curb returns are impacted by construction at an intersection then the tool is to assume: • All corners will have ADA ramps installed (8 total) • Curb at all four curb returns replaced • All concrete panels/Asphalt in intersection replaced (total 100’x25’) • Two catch basins replaced with COS Type 242. Use COS Unit prices for this work. *Note: If the ADA ramps are not impacted by construction and/or the companions meet SDOT standards not requiring replacement, then the user should adjust quantities accordingly.*

NO	Element	Issue to resolve	Assumption for Budget Estimating Tool for Initiation & SPU's Options Analysis/WTD's Problem Definition Phases
9**	Underground Injection Control Screen Well for Discharge of Treated Stormwater (UIC Screen Well & MH)	Determine Unit Price for UIC Well & MH	UIC well types can vary in type and cost. For the cost estimating tool, we reviewed the bid results from WTD's Barton project. Barton installed a UIC well sand packed well, 12" bore hole, 8" diameter casing & screen, average 28' screen, average drill depth 74', modified COS Type 205 MH with custom lid and base. See detail on D8 of the Barton set. The average unit price for UIC well & MH (including UIC flow testing, custom dual MH LID excavation, assembly etc) was **$45,000.** Given that there is a variety of UIC types and sizes and implementation is limited in Seattle, we recommend planners research current costs for the type of UIC intended (factoring in associated infrastructure and work that is required for having the UIC – such as upstream valves or CB sumps, testing during construction etc). The $$ provided here is a placeholder only and users are to develop their costs for the UIC screen well and associated appurtenances required (such as observation port, gate valves, MH size etc)
10	Underdrain Access MHs	Determine the number of Access MHs for underdrains	Assume that there is a COS Type 204B MH with 2-foot sump every 200 LF of underdrain pipe. Located at upstream and downstream end of underdrain run outside of the bioretention cell. Assume 10'x5' concrete sidewalk restoration for installation of MH.
11	Driveway Restoration for installation of Underdrain	Determine assumption for driveway restoration for installation of underdrain pipe.	Assume one concrete driveway is restored for every 200 LF of underdrain pipe and the driveway is 10' by 15'. This is based on the average # of driveways using a set of 15 Seattle Neighborhood Yield streets (~660' intersection to intersection).
12	Utility Trench Dam for Underdrain	Determine assumption for utility trench dam	Assume a utility trench dam is done for every 200 LF of underdrain pipe and cost is $300/dam.
13*	TESC, Traffic Control, Tree and Vegetation Protection	Provide an allowance for these items.	For 2017 update, we looked at Delridge and Ballard bid tabs and estimated from the average LS unit prices. Using the number of streets for each project (street = 660LF) we then came up with an average per street to use in the tool. These numbers are based on earthwork occurring <u>outside</u> of the wet season. **TESC: $7500/street** **Traffic Control & Protection: $9600/street** **Tree and Vegetation Protection: $1500/street** At planning phases, when # of streets is unknown, in order to convert bioretention area to # of streets, we reviewed the designs for Barton which had approximately 2500 sf of bioretention area (as calculated in #3) per street (660LF intersection to intersection). (Total bioretention area in sf)/(2500sf)=# of units for these elements.

NO	Element	Issue to resolve	Assumption for Budget Estimating Tool for Initiation & SPU's Options Analysis/WTD's Problem Definition Phases
14	Clearing Grubbing and Haul	Determine assumptions for units for Clearing Grubbing and Haul	Based on the landscape area calculated in #3, use the same area.
15*	Drain Curb Cut Type 1	# of units	Assume one drain curb cut for every 16 LF of bottom length of bioretention swale. (average of 16 lf was the average bottom length at Barton, including presettling zones in a portion of the first cell on the block). The drain curb cut type 1 is per COS Std Plan 295b.
16*	Construction Plant Establishment	Determine assumptions/allowance for contractor's o&m for the 1st year	The unit will be square feet and based on the same area calculated for "Landscape Area for Bioretention Plantings" (same as #3). The unit cost for plant establishment assumes that the Construction Contractor will be responsible for maintenance of vegetation & trees for the first year (SPU's approach), for the GSI during construction. The unit cost is assumed at **$1.00/sf.** This is based on the landscape architect & engineer's estimate for WTD's Barton project and adjusted to account for 1 year of maintenance rather than the 3 months for WTD led projects. Cost was refined after reviewing maintenance cost for Barton in 2016. Unit cost also includes removal of trash and debris at drain curb cuts and in cells.
17*	Street Sheetflow Test through Inflow/Curb Cuts	Provide allowance for sheet flow testing inflow points/drain curb cuts during construction	This line item will be for testing the intake/inflow/drain curb cuts for each street to check that sheetflow from the roadway gutter/pavement and/or sidewalk flows into the bioretention facility during construction after cells are installed. This is to check flow to CB's (daylight into the bioretention cells), drain curb cuts, and other measures used to divert street runoff into the cells meet specification requirements without bypass. This line item is based on the engineer's estimate for Barton for each of 660+/- LF Neighborhood Yield streets that were partially retrofitted with roadside bioretention. The test used water from the irrigation system and connected it to a hose that was laid on the pavement upstream to ensure water flowed to gutter and into the inflow point (drain curb cut or catchbasin). **Street Sheetflow Test through Inflow/Curb Cuts: $1500/street** At planning phases, when # of streets is unknown, in order to convert bioretention area to # of Neighborhood Yield streets, we reviewed the designs for Barton which had approximately 2500 sf of bioretention area (as calculated in #3) per street (660LF intersection to intersection). (Total bioretention area in sf)/(2500sf)=# of units for this element.

NO	Element	Issue to resolve	Assumption for Budget Estimating Tool for Initiation & SPU's Options Analysis/WTD's Problem Definition Phases
18*	Civil Structures O&M – 1st year	Determine assumptions/allowance for contractor's o&m for the 1st year	This line item is for maintenance of the installed civil structures during the first year of plant establishment that might be under the construction contract or done by others as part of the commissioning. This maintenance is for items such as removal of trash and debris from CBs, inlets, pipes, underdrains and culverts draining into and/or between cells. This line item is based on the engineer's life cycle cost estimate for Barton for each of 660+/- LF Neighborhood Yield streets that were partially retrofitted with roadside bioretention. **Civil Structures O&M – 1st year: $2000/street** At planning phase, when # of streets is unknown, in order to convert bioretention area to # of Neighborhood Yield streets, we reviewed the designs for Barton which had approximately 2500 sf of bioretention area (as calculated in #3) per street (660LF intersection to intersection). (Total bioretention area in sf)/(2500sf)=# of units for this element.
19*	Specialty O&M – 1st year	Provide placeholder for design teams to identify specialty O&M	With various types of UICs that might be used or non-standard design elements that are not in the City's standard plans that might have special O&M considerations or testing requirements in the first year, we would like to add a line item to the unit cost tab for "Specialty O&M". The users of the tool would need to fill in the unit cost allowance and document their assumptions.
20 **	Sidewalk replacement for cells with 1 wall or 4-walls	Determine assumptions for calculating sidewalk to be replaced when installing cells with a wall next to the sidewalk.	Assume there is an existing 5' sidewalk that is to be removed and replaced with a 6' wide (2017 standard) sidewalk when a wall is installed for bioretention (this would apply to sections shown as Type 1, 2, 11 & 12). The length of sidewalk to be replaced is assumed to be the length of the wall plus the distance between walled cells in a series. The amount of walk replaced could be two to four times the length of the wall. For the automation in the tool, assume the amount of walk replaced is 68' per 16' bottom length of cell (2 x 34' length of disturbed landscape area per cell, see #3). The reason for replacing the walk between cells is to provide continuity in the sidewalk width for pedestrians. For graded bioretention cells adjacent to existing sidewalks, assume the sidewalk is in good condition and remains; however, it is recommended that users review sidewalk conditions and provide an allowance for sidewalk replacement if the sidewalk has significant cracking, sunken or uplifted.

NO	Element	Issue to resolve	Assumption for Budget Estimating Tool for Initiation & SPU's Options Analysis/WTD's Problem Definition Phases
21 **	ROW Encroachment Allowance	Provide placeholder for teams to determine an allowance for addressing encroachments	Fences, rockeries, walls, sheds located within the ROW may have to be relocated if they encroach on public right-of-way. The adjacent property owner will be notified to relocate the encroachments but if they remain then the construction contract would remove. Provide a placeholder unit cost item for users to use as an allowance for addressing encroachments. This line item could also be used for trimming back vegetation that has overgrown and blocked the sidewalk adjacent to the bioretention cell. Sidewalks are to be clear of obstructions adjacent to bioretention cells. The users of the tool would need to fill in the unit cost allowance and document their assumptions.

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Appendix M: Miscellaneous Resources

- Potentially applicable permit and compliance triggers

PERMIT AND COMPLIANCE TRIGGERS

Permit/Approval	Trigger	Apply (Y/N/M)	Submittal Information	Typical Design Level for Submittal	Typical Review Timeline	Agency Contact Information	Comments
Notes: Many agencies are moving towards more online services, such as providing for applicants to submit permits online. This matrix may not keep up with regulatory and agency changes, so please check their web sites.							
FEDERAL PERMITS AND COMPLIANCE							
U.S. Army Corps of Engineers (Corps)							
Clean Water Act (CWA) - Section 404	Discharge of dredge or fill material into waters of the U.S., including wetlands requires permit from U.S. Corps of Engineers (Corps). A Section 404 permit requires a CWA Section 401 Water Quality Certification and Coastal Zone Consistency from Ecology (See below under State Permits from Washington Department of Ecology for additional details). Nationwide Permits (NWP) or Individual Permit for a project depending on project. Generally, wetland impacts under 0.5 acre trigger a NWP. Each specific NWP has its own conditions and limitations.		Submit a Joint Aquatic Resource Permit Application (JARPA) to Corps and to Ecology. JARPA drawings have specific requirements. Most important is size (8.5x11). Submittal may require Biological Evaluation, Wetland/Stream Delineation, Cultural Resources report or other items, depending on project location. The Seattle Biological Evaluation (SBE) and its accompanying Specific Project Information Forms (SPIFs) may be used for projects in Seattle (http://www.seattle.gov/util/seattlebiologicalevaluation).	60%	Nationwide Permit: 3 – 6 months Individual Permit: at least 12 months (up to 24 months)	Jacalen Printz. U.S. Corps of Engineers, Regulatory Branch, 4735 E. Marginal Way S., Seattle, WA 98134-2385 Phone: 206-764-6901 Email: Jacalen.M.Printz@usace.army.mil	Corps will decide whether it will review a project under the Individual Permit, Nationwide Permit (NWP) or Regional Permit process. Rarely and if applicable, the Corps may provide a letter (of determination) stating it does not have jurisdiction or will not take jurisdiction under the CWA. Project-specific compliance with NEPA, Section 106 of the NHPA, and/or ESA/MSFCMA may be required. Early during design, consider if compensatory wetland mitigation is required and whether it is mitigation banking, in-lieu fee or permittee responsibility in perpetuity. SPU conducts bi-monthly Federal Pre-Application meetings for convenience to agencies and Seattle departments.
Rivers and Harbors Act Section 10 Permit (Navigable Waters)	Applies to activities conducted in, over or under "navigable waters of the U.S." This means work below Mean High Water (MHW) for saltwater or the Ordinary High Water (OHW) for freshwater elevations. Activities include dredging, disposal of dredged material, filling, excavation, pipe valve modification, or any other disturbance of soils/sediments or modification of a navigable waterway.		Typically same information as required for the Section 404 Permit listed above.	60%	Nationwide Permit: 3 – 6 months Individual Permit: at least 12 months (up to 24 months)	Jacalen Printz. U.S. Corps of Engineers, Regulatory Branch, 4735 E. Marginal Way S., Seattle, WA 98134-2385 Phone: 206-764-6901 Email: Jacalen.M.Printz@usace.army.mil	Note that even though your project site may be some distance from the water, if it is below MHW you may need a Section 10 Corps permit. Generally, a Section 401 Water Quality Certification and Coastal Zone Consistency from Ecology are not required as part of the permit.
U.S. Coast Guard							
Rivers and Harbors Act Section 9 Permit (Bridges)	This permit is required for new construction, reconstruction or modification of a bridge or causeway over navigable waters of the United States. Federal law prohibits the construction of any bridge across navigable waters of the United States unless first authorized by the Coast Guard. The Coast Guard approves the location and clearances of bridges through the issuance of bridge permits or permit amendments, under the authority of the General Bridge Act of 1946, Section 9 of the Rivers and Harbors Act of 1899, and other statutes.		JARPA (Permit Application) Plan drawings	60%	At least 3 months. Permit issuance dependent on CWA Section 401 and Coastal Zone Management Certification.	United States Coast Guard Commander 13th Coast Guard District Attn: Bridge Administrator 915 Second Ave, Room 3510 Seattle, WA 98174-1067 Phone: 206-220-7282 Fax: 206-220-7265 Website: http://www.uscg.mil/d13	Review includes a mandatory 30-day public comment period.

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U.S Fish and Wildlife Service (USFWS) and National Oceanic and Atmospheric Administration (NOAA) Fisheries							
Endangered Species Act Compliance (ESA) Section 7	Compliance required if a project or maintenance activity is located near where there are species listed under ESA or their critical habitat could be affected. Consultation with the USFWS and/or NOAA required when an action the agency carries out, funds, or authorizes (i.e., CWA Section 404 permit) may affect an ESA-listed endangered or threatened species or their critical habitat. The U.S. Fish and Wildlife Service (USFWS) authority is for plants, terrestrial animals (including birds), and freshwater species. The National Oceanic and Atmospheric Administration (NOAA) Fisheries is for marine plants and animals, anadromous fish and marine mammals.		Process begins with a pre-consultation with the USFWS and/or NOAA to discuss whether ESA-listed species or critical habitat may occur in the proposed action area, and what effect the proposed action may have on those species or critical habitat. If it appears that the action may affect a listed species, agency prepares a Biological Assessment (BA) or Biological Evaluation (BE) to assist in determining effect on species. SPU may develop the materials required for agency review. There is also an existing MOA that may be applicable. If the project is within the City of Seattle and requires a Corps permit or other Federal nexus, the Seattle Biological Evaluation (http://www.seattle.gov/util/SeattleBiologicalEvaluation) may be used, with the Specific Project Information Forms (SPIFs) submitted with the JARPA. Information is also provided at the link above on the species within the City of Seattle boundaries.	Beginning of Options Analysis.	Depending on requirements 3 to 12 months is typical. Timeline will vary depending on the project's potential impacts to listed species and if a BA or BE is required.	Jim Muck U.S. Fish & Wildlife Service and National Marine Fisheries Service Phone: 206-526-4740 Email: Jim.Muck@noaa.gov	If the USFWS and/or NOAA Fisheries determine that the action is likely to adversely affect a listed species or designated critical habitat, a formal consultation is arranged. As part of the consultation the Service prepares a biological opinion on the action. If the action is determined to result in jeopardy to the species or adversely modify critical habitat, the Service provides SPU with an alternative (reasonable and prudent) to avoid jeopardy. If applicable the Service can issue an incidental take statement following consultation.
NOAA Fisheries (aka National Marine Fisheries Service)							
Magnuson-Stevens Fishery Conservation and Management Act (aka Magnuson-Stevens Act) Consultation	Compliance required if an action may adversely affect Essential Fish Habitat (EFH). Federal agencies are required to consult with NOAA Fisheries regarding actions that are authorized, funded, or undertaken that may adversely affect EFH.		SPU develops the materials for agency review. The federal agency must provide NOAA Fisheries with an assessment of the action's impacts to EFH, and NOAA Fisheries provides the federal agency with EFH Conservation Recommendations to avoid, minimize, mitigate, or otherwise offset those adverse effects. Federal agencies must provide a detailed written explanation to NOAA Fisheries describing which recommendations, if any, it has not adopted.	Beginning of Options Analysis.	Timeline will vary.	Jim Muck U.S. Fish & Wildlife Service and National Marine Fisheries Service Phone: 206-526-4740 Email: Jim.Muck@noaa.gov	There are many situations where designated EFH overlaps with the habitat of species listed as threatened or endangered under the ESA. Thus, a proposed Federal action could affect both a listed species and its designated critical habitat and adversely affect EFH, necessitating consultation under both section 7 of the ESA and section 305(b)(2) of the MSA. Because of this dual obligation, the Federal action agency and NOAA Fisheries can find efficiencies by integrating EFH and ESA consultations.

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Federal Agency with Jurisdiction							
National Environmental Policy Act (NEPA)	NEPA is usually required if there is federal money, permitting or land involved. Compliance is required whenever an agency proposes to take “a major Federal action.” A “major Federal action” is any action that has the potential for significant impact on human environment. Typical actions: - Construction - Awarding grants - Approving permits - Research and Development - Real Estate actions (leasing, disposal, acquisition) - Real Estate actions (leasing, disposal, acquisition)		The NEPA process begins when an agency develops a proposal to address a need to take an action. Once a determination of whether or not the proposed action is covered under NEPA is made, there are three levels of analysis that a federal agency may undertake to comply with the law. These three levels include: 1. Preparation of a Categorical Exclusion (CE), 2. Preparation of an Environmental Assessment (EA) and Finding of No Significant Impact (FONSI); and/or 3. Preparation and drafting of an Environmental Impact Statement (EIS) and Record of Decision (ROD).	NEPA begins around 10% Design.	Varies on the complexity of the project and the required documentation.	Varies depending on the federal lead agency.	The amount of documentation and any supporting reports required for a CE, EA or EIS will vary based upon project location and the proposed actions being taken. Early coordination will determine the appropriate level of documentation. Public participation could be required even for a CE depending on the location of the project and the concern of the surrounding residents. Alternatives need to be adequately identified with impacts assessed for an EA or EIS
National Historic Preservation Act (NHPA) Section 106 Review	Any federal agency whose project, funding or permit may affect a historic property or historic site, both those listed or eligible for inclusion in the National Register of Historic Places, must consider the effects on historic properties/sites and "seek ways to avoid, minimize or mitigate" any adverse effects on historic properties/sites. Washington State Department of Archaeological and Historic Preservation will consult with applicable tribes.		The typical Section 106 Review involves four primary steps: 1 - Determine/Identify Area of Potential Effects (APE); 2 - Identification of Historic Properties/Sites; 3 - Assessment of Adverse Effects; and 4 - Resolution of Adverse Effects. If impacts are determined, mitigation and a Memorandum of Agreement may be required. Further steps may be required if there is a disagreement among the consulting parties on adverse effects or the resolution of the effects.	Options Analysis or 30% design to define the APE and initiate Section 106.	Varies. Agreements between parties may take months. Includes at least one 30-day review period.	<u>If Corps permit</u>: Jacalen Printz Phone: 206-764-6901 Email: Jacalen.M.Printz@usace.army.mil If Other: Lead federal agency (usually related to NEPA contact)	If the area has been previously undisturbed or any buildings over 50 year old some form of field investigation will be required. You can consult Karen Gordon, Seattle Historic Preservation Officer. Can be related to Washington Governor's Executive Order 05-05 (see below under State). May involve the federal Council on Historic Preservation. Fieldwork should wait until some level of design is complete.
Federal Emergency Management Agency (FEMA)							
Federal Emergency Management Agency (FEMA) Flood Compliance	The project or activity is within a designated floodplain. Refer to the Department of Planning and Development (DPD) Tip 111 for floodplain information. Floodpain maps can be access online through FEMA's Map Service Center and can be viewed at the DPD Public Resource Counter or online at http://web1.seattle.gov/dpd/maps/dpdgis.aspx. Consider viewing both FEMA and DPD mapping.		The best information on submittal requirements is given in DPD Tip 111 (floodplains). Information listed in the Checklist must be provided to DPD as part of another DPD permit. However, if no other DPD permit is required, submit only Checklist items 1, 3 and 7 to receive a Floodplain Development License from DPD. Other references are Tip 103B (environmentally critical areas (ECA)), Director’s Rule (DR) 8-89 and Seattle Municipal Codes 25.06 (floodplains) and 25.09 (ECA).	Options analysis and 60% design	Refer to the Master Use Permit (MUP) /Land Use Permit/ Approval	Seth Amrhein, DPD Phone: 206-386-1981 Holly McCracken, SPU Phone: 206-386-4195 Note that SPU has a Memorandum of Agreement with DPD for use of facilitators (see DPD in this table for contacts).	FEMA flood compliance is based on Seattle Municipal Code (SMC) 25.06 and DOD Tip 111. Compliance with the ECA code is secondary and overlaps with 25.06. Under current regulations, sites that are based on SPU mapping and not FEMA mapping are only regulated by the ECA code (25.09). Note that there are upcoming changes to floodplain compliance requirements.

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Federal Energy Regulatory Commission (FERC), permitted by Washington Department of Ecology							
Federal Power Act of 2005 and Amendments Related to Dams and Reservoirs	A FERC license (or an exemption from licensing) must be obtained for any hydropower project within FERC's jurisdiction, including: projects on a navigable waterway; projects that would use federal land; projects that would use surplus water or water power from a federal dam; and projects that will affect interstate commerce (those that would be connected to a regional transmission grid). Operation, modification, and maintenance of any existing licensed hydro project are subject to FERC review and approval.		Dams need to follow FERC Design Guidelines and have an Emergency Action Plan (http://www.ferc.gov/industries/hydropower/safety/guidelines/eng-guide/chap1.pdf).	Varies so coordinate early with FERC Portland Office	Minimum 60 day review.	Protocol has been established for the Tolt River related FERC project. FERC local contact is located in Portland, OR.	The Tolt River Project, which includes 3 dams, is the only SPU project under FERC jurisdiction. Tolt River Project boundaries are clearly defined on SPU maps and any work with the boundaries is potentially subject to FERC review. Other SPU projects are under DOE jurisdiction Refer to Chapter 13 - Dam Safety for additional information including Independent Assessments for FERC that need to be done every 5 years.
Ecology Requirements - Dam Safety	Construction of a dam in Washington State must be permitted by Ecology (Ecology defines a dam as an artificial barrier that can impound more than 10 acre-feet (about 3.2 million gallons) of water). Any construction activities in or near an existing dam must be reviewed and approved before construction. Ecology does not regulate federally-owned dams and/or hydropower dams regulated by FERC.		Washington State Dam Safety Regulations control the design, construction, operation, maintenance, inspection, and supervision of dams. Construction must be consistent with Part 4 of the Ecology Dam Safety Guidelines.	Initial coordination; 30% design, and final design.			

PERMIT AND COMPLIANCE TRIGGERS

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Federal Highway Administration							
Section 4(f) of the 1966 Department of Transportation Act	Projects involving the use of, or within the vicinity of, publicly owned lands from a public park, recreation area, or wildlife refuge or any land from an historic site, otherwise known as 4(f) properties. Section 4(f) use includes both permanent and temporary uses of the property as well as constructive use which occurs when a project's proximity impacts results in the activities, features, or attributes of a property being substantially impaired.		Typically included as part of the NEPA documentation and required analysis depends on the level of impact. Projects that directly impact a park/recreation or historic Section 4(f)-eligible resource may need to include an analysis of avoidance alternatives to determine if there are any feasible and prudent alternatives that do not directly impact the resource. Where direct impacts are minor, or can be minimized and/or mitigated to a minor impact level, there can be a *de minimis* impact determination. A *de minimis* impact is defined as an impact that will not adversely affect the activities, features, or attributes of the resource; a *de minimis* determination takes into account all proposed minimization/mitigation measures. When a *de minimis* determination is made, a discussion of avoidance alternatives is no longer required for that resource, thereby greatly reducing the level of effort necessary. On projects where all alternatives result in a “use” (Section 4(f) language for a significant impact) of a Section 4(f) resource then an analysis must be performed in accordance with the statute that considers which alternative results in the “least harm” to the Section 4(f) property.	Early coordination with Section 4(f) property owners.	Depends on whether project will impact 4(f) property and extent of impact.	Depends on the lead agency.	Section 4(f) would typically be encountered on projects with a federal nexus for which Sound Transit, WSDOT, or Washington State Ferries is the lead agency.
Land and Water Conservation Fund Act (Section 6(f))	Once a city, county, or agency has used Section 6(f) for funds, either the land or the park appurtenances cannot be eliminated or acquired without coordination with the National Park Service (NPS) and mitigation that replaces the eliminated items. The mitigation must be at least at a ratio of 1:1, for both quality and quantity.		Typically included as part of the NEPA documentation. Requires documentation In Washington these funds are administered by the Washington State Interagency Committee for Outdoor Recreation (IAC). If LWCF funds were used to purchase a parcel, and a project would change the use of that parcel, replacement recreational lands of equal value would need to be provided. The DOI will likely need to get involved and approve the "conversion" of the parcel to a non-recreational use.	Early coordination with affected jurisdiction and NPS	Depends on whether project will impact 6(f) property.	Depends on the lead agency	Note that replacement property must be provided on the 1:1 ratio based on value, **not** acreage. The property provided as mitigation must be of equal or greater value than the property “converted” and provide a similar recreational experience.
National Park Service (NPS)							
Urban Park & Recreation Recovery (UPARR) Conversion	Removal of park use within areas covered by a previous UPARR Grant. UPARR grant restrictions must be transferred to a new conversion area for all areas to which the project will impact recreational use.		Approval needed from National Park Service (NPS) for the area identified to have UPARR restrictions removed and new area to receive the transferred UPARR restrictions.	30% to better define impact and transfer areas.	12 months or more.	Heather Ramsay, National Park Service Pacific West Region Columbia Cascade Support Office 909 First Avenue Seattle, WA 98104-1060 Email: Heather_Ramsey@nps.gov	Seattle Dept. of Parks & Recreation concurrence required for transfer areas. NEPA, ESA, and NHPA requirements may also be required.

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Railroad - Burlington Northern Sante Fe Railroad							
Pipeline or Wire Line	Installation of pipeline for water, sewage, etc. within BNSF rights-of-way.		Application for Pipeline or Wire Line - Crossing and/or Longitudinal Drawing(s) showing dimensions and distances to the centerline of the nearest railroad track and road crossing, bridge, or other railroad structure. Installations on BNSF property needs to follow the Utility Accommodations requirements.	30%	4 weeks	Jones Lang LaSalle Brokerage (JLL) Attn: Permit Services 4300 Amon Center Blvd., Suite 100 Fort Worth, TX 76155	(1) Railroad maps can be provided to assist with project references. Maps provide information on the width of the corridor and other information on the railroad and can be obtained by contacting - BNSFMaps@bartwest.com. (2) Prior to any work all parties who will be working on the site will be required to complete the necessary safety training program. (3) Roadmaster needs to be contacted 10 days prior to beginning any work. Information is provided in the cover letter and executed contract.
Temporary Occupancy	Any work or temporary access within railroad right-of-way including above and below within 25 feet of the centerline of any trackage.		Application for Temporary Occupancy Drawing(s) showing dimensions and distances to the centerline of nearest railroad track and road crossing, bridge or other railroad structure.	Depends on purpose. Early in the process if survey is needed or closer 90% for construction vehicle access.	4 weeks	Same as Pipeline or Wire Line	Same as Pipeline or Wire Line
Private Crossing	Private crossing for vehicle, pedestrian, or bicycle access over BNSF railroad tracks.		Application for Private Crossing Drawing(s) showing dimensions and distances to the centerline of nearest railroad track and road crossing, bridge or other railroad structure.	30%	4 weeks	Same as Pipeline or Wire Line	Same as Pipeline or Wire Line
Railroad - Union Pacific Railroad (UPRR)							
Utilities Installation	Installation, either pipeline or wire line, may be considered encroachments, crossings, or both.		Application Drawing/Map indicating general location of the crossing - topographic map preferred Engineering drawing with detailed information on the crossing	30% to ensure project is defined.	45 to 120 days depending on crossing or encroachment.	Region Representative Union Pacific Railroad Company 1400 Douglas Street, Mail Stop 1690 Omaha, NE 68179	
Temporary Use of Railroad Property	Any work or temporary access within railroad right-of-way including above and below within 25 feet of the centerline of any trackage.		Application for Right of Entry Temporary Use Checklist	Typically closer to construction	4 weeks	Region Representative Union Pacific Railroad Company 1400 Douglas Street, Mail Stop 1690 Omaha, NE 68179	

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STATE PERMITS OR COMPLIANCE							
Department of Archaeology and Historic Preservation (DAHP)							
Cultural Resources - <u>in general</u> (Includes considerations for SEPA and construction contracting)	In general, projects considerations should include the potential to modify a designated or eligible historic resource and the potential to affect archeological resources, especially if digging in native soils.		Depends on cultural resource, potential impacts and applicable laws and regulations. Normally include Seattle 2014 Standard Specifications Section 1-07.5(6) in the construction contract.	Initially in Options Analysis and 30% and 60% design, as applicable.	Depends on cultural resource, potential impacts and applicable laws and regulations.	Applicable federal or state agencies. Seattle Historic Preservation Officer in the Department of Neighborhoods is a resource.	2104 Seattle Standard Specifications for Municipal Construction 1-07.5(6) includes Washington state regulatory references RCWs 27.44, 27.53, 42.56.300, and 68.60 and WAC 25-48; and Seattle Municipal Code 15,05.660-.675. Consider if applicable and described earlier in this table, the federal National Historic Preservation Act.
Governor's Executive Order 05-05 Compliance (Archeological & Cultural Resources)	State agencies with capital improvement projects or land acquisition projects for the purpose of capital projects. Applies to Seattle projects if there is a Washington State nexus, such as with some grant and loan programs.		The Washington Department of Archaeology and Historic Preservation (DAHP) and/or the lead Washington State agency. For example, the Washington Resource Conservation Office may require EO 05-05 compliance when providing some grants and, as such, they are the EO 05-05 lead agency which includes consultation with DAHP. EZ-form can be used to initiate the process. Depending on project location and age of buildings/structures a Historic/Cultural Resources Report may be required.	Initially assess when selecting project a site and/or considering outside funding	3 to 6 months, and could take longer. Depends if field work is required and the lead agency process, if applicable.	Lead Washington State agency or Washington Department of Ecology or Health, if receiving funding directly through them. Recommend informing Karen Gordon, Seattle Historic Preservation Officer.	When selecting project a site, determine whether cultural resources may exist in the area and follow appropriate steps as soon as possible. Coordination with DAHP and Tribes is required and is normally done by lead State agency. See NHPA Section 106 Review (above under Federal) for additional information. If both EO 05-05 and the NHPA Section 107 are required, work with the applicable state and federal agency to see if both can be done together.
Archaeological Excavation Permit	A permit from DAHP must be obtained prior to any excavation that will alter, dig into, deface, or remove known or suspected archaeological resources, Native Indian graves, cairns, or glyptic records.		Archaeological Excavation Permit Application WAC 25-48-060 provides complete information on required information for the permit application. A number of plans are required to support the permit application including site restoration, site security, and public participation.	None. Required when something is discovered or is known to exist.	45-60 days (Includes 30-day review by Tribes & others)	Stephenie Kramer Assistant State Archaeologist Phone: 360-586-3083 Email: Stephenie.Kramer@dahp.wa.gov	Note that, in particular, SEPA, NEPA and the Corps require addressing cultural resources. The permit would be submitted after a site has been discovered or if the site is known to be within a project area and additional information is required to determine the site boundaries.
Unanticipated Discovery Plan (UDP)	All projects involving ground disturbance in native soils. UDP includes procedures and contact information is cultural resources or human remains are encountered during construction. Typically completed as part of the cultural resources report.		Develop an Unanticipated Discovery Plan prior to construction, which details what must be done if cultural resources or human remains are found during construction. Put the plan in construction contract documentation.	Prior to construction, or earlier if required by a federal or Washington state agency.	Several months. If discovery is made, length of time could be considerable.	County Medical Examiner/Coroner and Guy Tasa State Physical Anthropologist Phone: 360-586-3534 Email: Guy.Tasa@dahp.wa.gov	DAHP can be consulted for assistance. If there is a finding, the county medical examiner/coroner and local law enforcement must be contacted expeditiously.

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Washington Department of Ecology (Ecology)							
(Clean Water Act) State Section 401 Water Quality Certification	Applying for a federal permit or license (such as permits from the Corps of Engineers or US Coast Guard) to conduct any activity that might result in a discharge of dredge or fill material into water or non-isolated wetlands or excavation in water or non-isolated wetlands.		JARPA (Permit Application) submitted either online or mailed to Ecology at: Department of Ecology - SEA Program Federal Permit Coordinator PO Box 47600 Olympia, Washington 98504-7600 However, if receiving a Corps of Engineers nationwide permit (NWP), consult the Corps to find out the particular NWP will include the Ecology 401 Water Quality Certification.	Depending on project schedule constraints apply at 30% or 60 % design	Nationwide Permit (NWP): 1 to 4 months. Typically 1 month. Individual Permit: 1 to 12 months. Typically 3 months.	Rebekah R. Padgett Federal Permit Manager Phone: 425-649-7129 Email: rpad461@ecy.wa.gov	If a Corps uses one of their NWP and it includes Ecology's 401 Water Quality Certification, no Ecology action is required. If Ecology has not approved under the NWP (either partially denied or denied without prejudice), a Letter of Verification or individual certification will be required from Ecology. For Individual Permits, Ecology conducts a minimum 21-day public notice and has up to 1 year to approve.
Coastal Zone Management Program Consistency Determination	Projects located within Washington's 15 coastal counties (including King County) and need a federal permit or have federal funds require a written determination from Ecology of consistency with the Washington Coastal Zone Management (CZM) Program.		Submit a Certification of Consistency form to Ecology for concurrence or objection. Whenever submitting a an permit application (JARPA) to the Corps of Engineers, always submit it to Ecology too. This requirement may or may not be included in a Corps of Engineers nationwide permit (NWP): Consult the Corps to find out if a consistency determination will be included in your NWP.	Depending on project schedule constraints apply at 30% or 60 % design	2 to 6 months depending on project. Typically 2 months. However, Ecology legally has 180 days. There may be a 21-day public comment period.	Rebekah R. Padgett Federal Permit Manager Phone: 425-649-7129 Email: rpad461@ecy.wa.gov	Note that there is regulatory overlap and this can be confusing: The Shoreline Management Act of Washington also includes implementation through local regulators, such as King County for unincorporated areas and the Seattle Department of Planning (DPD) and Development for Seattle. For projects not required to provide a public involvement process through shoreline or Corps permits, or for large, complex and controversial projects, Ecology provides a 21-day public comment period witha potential meeting or hearing.

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Construction Stormwater General Permit (NPDES)	Required if clearing, grading or excavating activities disturb an area of 1 acre or more and will discharge stormwater to surface waters of the state or a conveyance system that drains to surface waters of the state. Surface waters of the state are broadly defined by state law and include storm drains, ditches, wetlands, creeks, rivers, lakes and marine waters. In addition to these permit triggers, Ecology reserves the right to require permit coverage at a construction site of any size. The permit requires construction site operators to install and maintain erosion and sediment control measures to prevent stormwater from washing soil, nutrients, chemicals and other harmful pollutants into local water bodies.		Construction Stormwater General Permit Application, a Notice of Intent (NOI). Suggest using the online electronic application process. SPU Director must provide hard copy signature. NOI prior to first public notice and at least 60 days prior to discharging stormwater. Two notices in the City's legal newspaper. Typically the permit is transferred to the contractor. Make sure contract plans and specifications include NOI requirements. "Construction Stormwater General Permit, Proposed New Discharge to an Impaired Water Body" form, if discharge will be to an impaired water body identified on Ecology's 303(d) list. Stormwater Pollution Prevention Plan (SWPPP), but does not need to be included with theNOI. The construction contractor can develop the SWPPP.	90% - permit acquired just prior to start of construction.	Usually 60-90 days after Ecology receives application. Construction cannot start until after 60 days of submitting a complete NOI and at least 31 days after the second public notice; public appeal is possible.	Josh Klimek 360/407-7451 Josh.klimek@ecy.wa.gov	SEPA needs to be complete before permit coverage is obtained. Include all contractors, subcontractors, SPU and other entities in the permit. As the statewide general permit expires 12/31/15, a renewal application must be sent to Ecology at least 180 days prior to continuing permit coverage under a re-issued general permit. Ecology should notice all active permit holders in the spring of 2015 to explain the renewal process. Consult the SPU FAQ for more information.
Well-Drilling Permits	The permit requires construction site operators to install and maintain erosion and sediment control measures to prevent stormwater from washing soil, nutrients, chemicals and other harmful pollutants into local water bodies.		Submittal forms vary depending on the activity and may require field data and report(s). Also need to confirm that the basin has enough water for new wells. See web site. After well is constructed, re-constructed, or decommissioned a Well Report must be filed to Ecology within 30 days.	Inform Ecology at least 72-hours before work related to decommissioning or modifying.	Depends on action being taken with new well have longer process.	Noel Philip Phone: 425-649-7044 Email: nphi461@ecy.wa.gov or Greg Bishop (Seattle-King County Public Health Phone: 206-296-9753 Email: greg.biship@kingcounty.gov	Decommissioning must be done by licensed well drillers.
Underground Injection Control Registration	Applicants who are planning to install an Underground Injection Control (UIC) well are required to register. New wells need to be registered before use. UIC include a drywell, infiltration trench with perforated pipe, subsurface infiltration gallery, and large on-site septic systems.		Registration is done online.	UIC that are already installed or will be installed.	2 months	Mary Shaleen-Hansen Water Quality Program WA Department of Ecology P.O. Box 47600 Phone: 360-407-6143 Email: maha461@ecy.wa.gov	UIC wells are sometimes used in conjunction with Green Stormwater Infrastructure (GSI).
Underground Storage Tank (UST) Notification	Removal, installation and licensing of UST. Typical for fuel (i.e., heating oil for residences and fuel storage for gas stations) and removal of tanks on acquired properties.		For temporary closure, required documents include: -Closure and site assessment notice If contaminant(s) are found, report within 30 days. For permanent closure, required documents: 30-day notice, closure and site assessment notice, site assessment/report, site check/site assessment checklist	90% (unless contaminants above the MTCA Clean Up Levels)	If getting a license, allow 30 days for its issuance.	Depends on what you are doing so call Ecology NW Regional Office 425-649-7000 or see web site for NWR contacts list or email tanks@ecy.wa.gov	USTs can involve removing a tank, replacing a tank, finding a spill, fixing a leak. Required action depends on what is needed. Depending on tank (such as home heating oil tanks), may be regulated by fire department and/or local city or county government.

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Hazardous Materials - Environmental Site Assessments (Phase I and/or II) Per Model Toxics Control Act	Database search(es) may indicate the presence of hazardous materials that could be affected, which would trigger the need for a Phase I and/or Phase II assessment. Potential for hazardous materials contamination - soils or building. Report prepared that identifies potential or existing environmental contamination liabilities. The actual sampling of soil, air, groundwater and/or building materials is typically not conducted during a Phase I ESA. Phase II Environmental Site Assessment collects samples to analyze for quantitative values of various contaminants. This investigation is normally undertaken when a Phase I ESA determines a likelihood of site contamination.		Not a permit. Site assessments are performed by specialists in hazardous materials. Generally, SPU building renovation/upgrade/maintenance projects mainly focus on surveying for Asbestos and Lead in building materials. Depending on building/facility age, PCBs may also need to be added to the list of hazardous materials to test for.	Phase I can be done early in the process to determine potential for hazardous materials. Phase II done for property acquisition if Phase I identifies hazardous materials.	Will depend on whether or not hazardous materials could be encountered.	Washington Department of Ecology Information and Policy Dave Bradley Phone: 360-407-6907 Email: dbra461@ecy.wa.gov NW Regional Office Phone: 425-649-7000 Web site: https://fortress.wa.gov/ecy/publications/SummaryPages/9406.html	All projects that disturbs soil or structures should assess whether contaminated materials may be present. This does not necessarily result in the need to do an ESA Phase I. Early in the project, it is important to ask if there may be hazardous materials on the site(s).
Dangerous Waste Regulations Compliance	Regulations provide Information on dangerous wastes including requirements for transportation, storage, and permit requirements.		Not a permit. Regulations provide information for permits.				
State Environmental Review Process (SERP) Compliance	Any project that may receive federal funds through the Clean Water State Revolving Fund (SRF) (administered by the Washington Dept. of Ecology) or the Drinking Water SRF (administered by the Washington Dept. of Health).		Requirements include SEPA documentation, cost effective analysis, public participation, and compliance with identified federal laws (known as "cross cutters"). NEPA compliance may substitute for SEPA compliance. If a federal agency has already reviewed a project against the federal cross cutters, the applicable state agency may adopt that agency's analysis. Note, in particular, that NHPA Section 106 or Washington EO 05-05 compliance is required and may take some time.	Contact the applicable state agency as soon as you think you may apply for funds	Varies, up to 18 months. Washington Departments of Ecology and Health have guidelines.	Applicable grant or loan contact in the Washington Departments of Ecology or Health Washington Department of Ecology Probably Alice Rubin Water Quality Program P.O. Box 47600, Olympia, WA 98504-7600 Phone: 360-407-6429 Email: alice.rugin@ecy.wa.gov	Drinking Water State Revolving Fund Loan Program web site is http://www.doh.wa.gov/CommunityandEnvironment/DrinkingWater/WaterSystemAssistance/DrinkingWaterStateRevolvingFundDWSRF.aspx Clean Water State Revolving Fund Loan Program web site is http://www.ecy.wa.gov/programs/wq/funding/FundingPrograms/CWSRF/cwsrf.html

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Washington Department of Fish and Wildlife (WDFW)							
Hydraulic Project Approval (HPA)	Any form of work that uses, diverts, obstructs, or changes the natural flow or bed of any fresh water or saltwater of the state (over, under, or within). This includes bed reconfiguration, all construction or other work waterward, under and over the ordinary high water mark (OHWM), including wetlands, dry channels, and may include projects landward of the OHWM (e.g., activities outside the OHWM that will directly impact fish life and habitat, falling trees into streams or lakes, bridge maintenance, dike construction, etc.).		Required submittal includes: • Map with all locations • Payment of, or exemption from, a $150 fee. Online APPS submittal allows an option for payment by check, but the application is not processed until payment is received. SPU Finance prefers payment by check, and not credit card. • SEPA compliance (SEPA must be demonstrated prior to acceptance of the application) • Hard copy JARPA or Simplified Application or online using APPS. Although APPS greatly simplifies the application process for HPAs, a JARPA may be needed for other permits. In those cases, applicants can copy and paste back and forth between the JARPA and APPS.	WDFW prefers 90%; 60%; might require a revised HPA if plans change (Permit usually issued for 2 years)	45 days after APPS electronic submittal of complete application for a standard permit. For other permit types, see "Types of HPAs" for timing. Note that there is usually a minimum 8-day tribal review.	Check for WDFW web site for the geographic-based Area Habitat Biologist. Representatives in Seattle include Larry Fisher, Laura Arber, and Christa Heller.	It is helpful to coordinate early with the WDFW area habitat biologist, which can include submitting a "pre-application," at no cost. Also consider checking the online technical assistance guidelines. Written notification of SEPA compliance must be provided prior to acceptance of an HPA application. If doing a categorical exemption (CE), check with WDFW to see if they agree. You may be eligible for a simplified application. Check the WDFW web site. Changes in project designs or schedule might require a new HPA application.
Washington Department of Natural Resources (DNR)							
Aquatic Lands Use Authorization or Aquatic Land Lease	Most activities taking place on state-owned aquatic lands (including harbors, tidelands, shorelands, and beds of navigable waters) may require an authorization, such as a license, lease, rights-of-entry, or easement lease. These state-owned aquatic lands include the coast, bedlands, lakes, rivers and Puget Sound marine areas.		JARPA (Permit Application) WDNR application and record of survey Other agencies permits, as applicable	30%	6 to 12 months after DNR receives a complete application.	WDNR, Shoreline District 950 Farman Avenue N Enumclaw, WA 98022-9282 Phone: 360-825-1631 Fax: 360-825-1672 Contact varies: See web site at http://www.dnr.wa.gov/Publications/aqr_land_manager_map.pdf	Completed SEPA and all other applicable permits (such as an HPA) are required before DNR can issue a authorization.
Forest Practices Permit	Usually not applicable within Seattle city limits. On forest lands, an application may be needed for timber harvest; salvaging logs, stumps or snags; constructing or modifying roads, culverts, bridges or gravel pits; or aircraft chemical spraying. Permit application needs to be consistent with permit requirements of any permits required from another agency.		Forest Practices Application/Notification - Western Washington Applications are received at the region office and reviewed for completeness. The region office scans complete applications on the DNR's Forest Practices Review System (FPARS) Applications are posted on the internet and available to registered reviewers. Reviewers include the departments of Ecology, Fish and Wildlife, the county/city/town, and affected Indian tribes.	30%	30 to 45 days depending on the application (3 year or 4-15 year application).	WA Dept. of Natural Resources 950 Farman Ave. N Enumclaw, WA 98022 Phone: 360-825-1631 Fax: 360-825-1672 King County Dept. of Permitting & Environmental Review 35030 SE Douglas St., Ste. 210 Snoqualmie, WA 98065-9266 Phone: 206-296-6600	If a forest practices permit is required, it may also serve as an application for fisheries review instead of getting an HPA from WDFW. Classes 1 and III Forest Practices within Urban Growth Area jurisdiction or a Class IV General Forest Practice: King County Dept. of Permitting & Environmental Review. Web site: http://www.kingcounty.gov/property/permits/info/SiteSpecific/forest/ClassIV.aspx Shoreline Permit and SEPA must be complete before permit is issued
Washington Department of Transportation (WSDOT)							
General Permit	General permits are typically issued for miscellaneous work that is to be done within the WSDOT Right-of-Way. The type of work ranges from landscaping, mowing, and hazard tree removal to surveying, soil testing for hazardous waste contamination, etc.		General Permit Application	After 60%	1 - 3 months	Felix Palisoc Senior Development Services/Local Agency Engr. Phone: 206-440-4413	Permit must be obtained before any construction work can occur within WSDOT right-of-way

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Franchise Agreement	Utility: Occupancy of a highway right-of-way by utility facilities that cross the highway or installations 300 feet or less longitudinal to the highway. Franchise: Occupancy of a highway right-of-way by utility facilities that continue longitudinal to the highway for more than 300 feet.		Utility Permit or Franchise Application Utility Plans WSDOT ROW Drawings with utility alignment shown Utility developed data to justify the installation Surety Bond Traffic Control Plan Utility Facility Description Worksheet Establishment of JA Account (billing purposes)	After 60%	2 -6 months. Will depending on the work being done.	Ahmed Wehbe Region Utility Accommodation Engineer Phone: 206-440-4125 Email: wehbea@wsdot.wa.gov	Work must begin within 1-year of receiving the permit and needs to be completed within 3-years.
LOCAL PERMITS AND COMPLIANCE							
King County Department of Permitting and Environmental Review							
King County Building and/or Land Use Permit(s) for Projects in Unincorporated King County	Projects within unincorporated King County will trigger the need for permits from the County, such as building and land use permits similar to those required by Seattle Department of Planning and Development for projects within the City of Seattle. Determine required permits early in the project.		Submittal requirements depend on the project. Coordinate with King County Department of Permitting & Environmental Review for complete information.	Depends on the permit	Depends on the permit	Dept. of Permitting & Environmental Review 35030 SE Douglas St., Ste. 210, Snoqualmie, WA 98065-9266 Phone: 206-296-6600	Examples: Building permits for plumbing, mechanical, electrical and underground storage tank. Land use permits for clearing and grading, conditional use, critical area alteration exception, master drainage plan, right-of-way use, shoreline substantial development, shoreline conditional use, shoreline exemption and shoreline variance. Other applications include fire permit (as for watermain extensions) and drainage adjustment.
King County Metro							
Construction Notification/ Approval	For work resulting in line deactivation to any part of the Trolley Overhead (TOH) system and motorization of affected Trolley Coaches, and also for impacts to any other Metro services or structures.		Varies depending on services impacted. Trolley Overhead Deactivation Request Form Seattle Streetcar Overhead Deactivation form Seattle Streetcar Right-of-Way form In addition a SDOT Street Use Permit will apply and must be completed and approved before project can proceed.	100% (Provide at least 2 weeks notice prior to construction beginning)	Based upon work 3 to 15 business days.	Kevin Hendricks Construction Information Coordinator Phone: 206-263-5163 Email: Construction.Coord@ kingcounty.gov	Deactivation of overhead trolley is limited to weekends only (meaning no earlier than 3:00 a.m. Saturday morning and continuing through Sunday until the end of service, which can be up until 3:00 a.m. Monday morning if necessary. May need new bus stops. May be taken care of by contractor.

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King County Real Estate Services							
King County Right-of-Way Compliance	Approval is needed if constructing in the King County right-of-way. This includes installing pipes underground.		Coordinate with the King County Facilities Management Division, Real Estate Services, if constructing in their right-of-way.	Depends on the permit	Depends on the permit	Real Estate Services, King County Administration Bldg. 500 Fourth Ave., Suite 830, Seattle, WA 98105 Phone: 206-296-7456 Email: RES.Permits@kingcounty.gov	Notify the Road Services' Utility Inspection Unit of job starts prior to beginning work
Utility Use Permit	Required for both public and private utilities which require the use of King County property in which the County has an ownership interest.		Letter containing the following: • Applicant name, address and phone number • Proposed county property use • Plans depicting location • Installation, construction, & maintenance methods • Define required permits • Use duration • Project cost	To be determined	To be determined	Mail your letter to: Real Estate Services Section 500 Fourth Ave., Suite 830 Mailstop ADM-ES-0830 Seattle, WA 98104 RES.Permits@kingcounty.gov 206-296-7456 Fax 206-296-0196	There may be fees required for the processing, administration, land use, inspection, and plan review associated with the permit request. There may also be a requirement to make King County an additional insured on your insurance policy and bonding requirement to reduce King County exposure to liability and damage.
Special Use Permit	Required for the use of King County property in which the County has an ownership interest.		Letter containing the following: • Applicant name, address and phone number • Proposed county property use • Plans depicting location • Installation, construction, & maintenance methods • Define required permits • Use duration • Project cost	To be determined	To be determined	Mail your letter to: Real Estate Services Section 500 Fourth Ave., Suite 830 Mailstop ADM-ES-0830 Seattle, WA 98104 RES.Permits@kingcounty.gov 206-296-7456 Fax 206-296-0196	There may be fees required for the processing, administration, land use, inspection, and plan review associated with the permit request. There may also be a requirement to make King County an additional insured on your insurance policy and bonding requirement to reduce King County exposure to liability and damage.
King County Wastewater Treatment Division (WTD)							
King County (Industrial Waste Program) Wastewater Discharge Permit - For Construction Dewatering	King County Industrial Waste Program Wastewater Discharge Permit is required to discharge industrial/commercial wastewater to the King County sanitary sewer system, this includes dewatering. Water may be discharged into the sewer only if authorized by King County. Reference RCW 90.48.165, RCW 35.58.180, RCW 35.58.200, RCW 35.50.360, and King County Code 28.84.060.		For dewatering, complete a Construction Dewatering Request Form Forms and Applications available at http://www.kingcounty.gov/environment/wastewater/IndustrialWaste/Forms/ApprovalForms.aspx	90%	Depends on level of project complexity 60-90 days.	King County Industrial Waste Program 130 Nickerson Street, Suite 200 Seattle, WA 98109-1658 Phone: 206-263-3000 and TTY Relay: 711 Fax: 206-263-3001 Email: Info.KCIW@kingcounty.gov	Discharge to Seattle sewers also requires SPU approval to discharge.
Approval or MOA to Connect to or Modify a King County Facility	Connection to or alteration of a King County facility, including a pump station or sewer main.		Letter of approval from King County which may place restrictions on flow revision or physical change	Options analysis	Varies depending on the project location and design.		Coordinate objects, plans and designs with the King County Wastewater Treatment Division.

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Public Health - Seattle & King County (Health Department)							
Backflow Prevention Assemblies Permit	Installation of a backflow prevention system.		Backflow Prevention Assemblies Permit Must also fill out the City of Seattle Backflow Prevention Assemblies Application Information Form and present it with your application submittal.	90%	To be determined.	Environmental Health Services Phone: 206-205-4394	Typically contractor obtained.
Health Permit (Air Gap)	Projects that involve plumbing and gas piping.			90%	Concurrent with the Building Permit.	Environmental Health Services Phone: 206-205-4394	Typically contractor obtained. This permit will be coordinated by DPD through its review of the Building Permit application.
Plumbing Permit	Installation, relocation, or modification of a plumbing system.		Plumbing Permit Application	90%	Concurrent with the Building Permit	Environmental Health Services Phone: 206-205-4394	Typically contractor obtained. Will be coordinated through the DPD Building Permit.
Puget Sound Clean Air Agency							
Asbestos Notification	Removal of asbestos within King, Kitsap, Pierce, and Snohomish County		Process can only be done online To submit a notification to the Puget Sound Clean Air Agency, you will need: • an asbestos survey	Depends - existing SPU facilities would be prior to any work or after property acquisitions.	2 weeks.	Puget Sound Clean Air Agency Phone: 206-689-4058 Email: asbestos@pscleanair.org	Before beginning any renovation or demolition, there must be a check for the presence of asbestos.
Notice of Construction/ Order of Approval	Any new or modified stationary air contaminant generating equipment and air pollution control equipment or operational modifications (including equipment, process, or design changes) that affect contaminant level emitted. The list of activities, as well as the types of sources that are exempt, are detailed in Regulation I, Section 6.03 (PDF 0.1MB). Note that engine generator equipment used for standby power <500 hr/yr. is exempt.		Notice of Construction Application	90%	30-day review period for notice of complete application. 60-day review to approve or deny permit.	PSCAA Permitting – Steve Van Slyke Phone: 206-689-4052 Email: stevev@pscleanair.org	
Seattle Design Commission (SDC)							
Project Review	Capital Improvement Projects, Right-of-Way projects, and major projects (including transportation infrastructure and master plans) within the City of Seattle.		No formal application is required. Depends on the type of project, but all require a meeting with commission staff. Proponents will be asked questions at meetings about the project and will make recommendations. Presentation and project overview needed to SDC. Review occurs during a scheduled meeting with the commission.	Conceptual, 30%, 60%, 90% public outreach info, conceptual drawings/ renderings	At least one or two meetings will be required, and more for large or complex projects.	Valerie Kinast Phone: 206-233-7911 Email: valerie.kinast@seattle.gov	
Seattle City Light (SCL)							
Electrical Service	An application for Electrical Service is required to determine the level of services that will be required for a specific project.		Application for Electric Service Completeness Guideline (All Services) SCL Service Approval Checklist	Between 60 to 90%	To be determined	Phone: 206-233-2777 Email: SCLserviceapplications@seattle.gov	Mail to: Seattle City Light, Attention: Intake Desk, 1300 N. 97th St., Seattle, WA 98103-3320

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Permit to alter or temporarily support SCL utility pole	Required for the temporary use or permanent use of SCL poles.		Pole Attachment Application Depending on the project a Master Pole Attachment Agreement may also be required.	60%	6 weeks to 3 months	City Light Distribution Design Office	At 60% have SCL look at pole(s) to determine next steps, including the need for any replacements. Depending on what is proposed a Street Use Permit from SDOT may also be required.
Seattle Department of Neighborhoods (DON)							
Certificate of Approval or Landmark Nomination	Coordinate with Department of Neighborhoods and if a project located in one of the following: 1. Landmark or special review district 2. Involves a designated City landmark 3. Includes property that may be eligible for landmark designation		Certificate of Approval application form and/or Landmark Nomination form Contact appropriate Department of Neighborhood to begin process and include Historic Preservation Program staff at a pre-submittal conference	During options analysis for project location or when project location is first identified	Depends on if there is an historic element. Could take a long time.	Karen Gordon, City Historic Preservation Officer City of Seattle Department of Neighborhoods, Urban Conservation Division 700 Third Avenue, 4th Floor Seattle, WA 98104 Phone: 206-684-0228	Seattle's Historic Preservation Program, located in the Department of Neighborhoods, is responsible for the designation and protection of more than 450 historic structures, sites, objects, and vessels, as well as eight historic districts throughout Seattle. Must submit an application for Certificate of Approval before a MUP or Construction Permit application can be submitted.

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Seattle Department of Planning and Development (DPD) – Refer to DPD "Tips." Also see Project Portal at http://web1.seattle.gov/dpd/eplan/							
Scoping of Permit Type with DPD	Projects requesting DPD paid assistance, especially complex projects, should apply to be in the DPD-SPU MOA program before a preliminary scoping meeting can occur. A form has been created to request DPD paid assistance (billed hourly) through the MOA. The form and MOA are located in SPU forms (see SPU network path locations to right). It is important that SPU Project Managers read the Intake Paid Assistance Form and MOA document. Email the completed Paid Assistance Form to Colin + Cindy. A determination will be made about point person at that time depending on request. If paid assistance through the MOA is not requested, do not use this process other than as a reference document for your permitting needs.		SPU Request for DPD Assistance Form network path Location: Reference web link at "D" under "SPUforms"	Conceptual	1 - 2 weeks prior to meeting.	Colin Vasquez, Senior Land Use Planner colin.vasquez@seattle.gov (email instead of calling) Cindy Hoover Permit Process Leader cindy.hoover@seattle.gov 206-233-2554 For Zoning: Lucas DeHerrera Senior Land Use Planner 206-615-0724 lucas.deherrera@seattle.gov	Colin specializes in Land Use Code, SEPA, Tree Protection and overall Master Use Permit process and requirements. Cindy specializes in Building Code, Grading Code, Flood Plain and overall Construction/Grading/Demolition Permit process and requirements. Meeting with DPD will determine the types of permit requirements and the approximate timelines. As noted, any specific SMC code requirements can be addressed at the meeting or in separate communications.
continuation of above row	Colin or Cindy will schedule the meeting and will provide information on the permits required and the requirements for applications. If needed, other DPD code reviewers can attend or be consulted to assist. Specific code application questions can be vetted subsequently by email or through additional meetings as needed. Point of contact (Colin or Cindy) will be assigned for the project to assist with needs depending on the type of permit required, assistance needed or code responsibility.	NA	NA	NA	NA	NA	Note: General applications: Preliminary Application Form (PAF) and Pre-Application Site Visit (PASV) Request Form. DPD issues a Preliminary Assessment Report (PAR).

PERMIT AND COMPLIANCE TRIGGERS

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Master Use Permit (MUP)/Land Use Permit	A single land use permit integrating process, procedures and review of all non-appealable and appealable land use decisions made by DPD. It generally includes discretionary land use decisions associated and provides for consolidated appeal. It is like an umbrella over various components including variances, conditional uses, shoreline substantial development and design review. Of the five types, Types IV and V require City Council decisions. References include Tip 201, MUP Overview and: *Tip 209 for shoreline permits, including substantial development permits, shoreline variances, special uses and shoreline conditional uses. *Tip 210 for variances from the Land Use Code *Tip 211A for administrative conditional use in single and multifamily zones *Tip 211B for administrative conditional use in residential commercial and commercial zones *Tip 330 for Environmentally Critical Areas (ECA) – yard and setback, steep slope and wetland buffer variances		See DPD Forms #9 and #11 Land Use Application Req and Permit Submittal Requirements: General Submittal List (Electronic Submittal Available) other information may be required depending on MUP -Full size plans with DPD coversheets (#4) -SEPA DNS by SPU (if applicable) -Financial Responsibility / Owner Authorization Form (#7) -Any required report (Geotech, Traffic, Trees, Wetland, etc.) -Any required application form (see Tips if applicable) -A comprehensive analysis of applicable codes and how the project proposes to meet them, including information/calculations as necessary (Stormwater, Land Use, ECA, Tree Protection) -ECA Exemption (if applicable) -Use the online DPD GIS. SPU can self exempt with documentation. -Department of Neighborhoods review documentation (if applicable) -Design Commission review documentation (if applicable) -8.5 x 11 Large Sign Illustration (if applicable) (See Director's Rule 29-2006) -JARPA (if applicable)	30%-60% depending on type of MUP	3 to 12 months depending on type of MUP Type I: 1-10 weeks Type II: 3-6 months Type V 6-12 months	Colin Vasquez Senior Land Use Planner colin.vasquez@seattle.gov (email instead of calling) Ben Perkowski (Shoreline Reviewer) 206-684-0347 ben.perkowski@seattle.gov Seth Amrhein (Wetland and Tree Reviewer) 206-386-1981 seth.amrhein@seattle.gov	At DPD's Project Portal (http://web1.seattle.gov/dpd/eplan/), an online tool, you can track all of your projects in one place. From the portal, you can also initiate new projects, pay fees, schedule inspections, and view scheduled appointments. Applications can be submitted online. Submit with the MUP application a completed SEPA and, if applicable, an ECA self-exemption and/or a JARPA. For ECA, Consult Tips 103B, 325, 326, 327a, 327b, 328, 329, 330, 331, 331A and 331B, as well as DRs 19-2006, 30-2006, 3-2007, 4-2007 and 5-1007. Public review and appeal periods vary depending on MUP type. MUP approval must be issued before any associated construction, grading, or demolition permit can be issued. Note that utility services in a single-family zone require demonstration of public necessity, meeting development standards for institutions and Council approval.
MUP - Shoreline Permits	A Shoreline Substantial Development Permit, Conditional Use or Shoreline Variance is required for work along the shoreline, as defined by the Shoreline Master Program. In Seattle, these include saltwater shorelines, Salmon Bay, Lake Union, the Ship Canal, Lake Washington, Green Lake, the Duwamish River and all "associated wetlands" of these water, extending 200 feet landward from the ordinary hight water level. Some work is exempt.		After a preliminary meeting and once it is determined that DPD permits are required, the next steps are: Apply for a project number (if required), request a site visit from DPD (if required), receive the Preliminary Application Report from DPD and other departments (SCL, SPU, SCL, SDOT, DPD), and submit permit plans and any other required information. A permit may not be officially submitted to DPD for review until the required preliminary application process is complete.	see above	See above. Ecology requires a 21-day appeal period and, if conditional use or variance, a prior 30 day review.	Ben Perkowski (Shoreline Reviewer) 206-684-0347 ben.perkowski@seattle.gov	This is a detail of possible requirements under the MUP addressed above. There are several types of shoreline permits and an exemption may be possible. Consult the DPD web site and the various "Tips," particularly 209 and 209A. Note that utility services in a Conservancy Preservation shoreline designation require a Shoreline Conditional Use permit.

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Building Permit - In General	Construction of new facilities requiring review per the Seattle Building Code (SBC) and include shoring designs. Some building permits are listed in the rows below.		Submittal information will vary depending on type of structure. The shoring design is submitted with the building permit application if required to protect the adjacent property or structures on the site. If needed, the design can be modified later with the submittal of a permit revision (contractor design). (DPD will route shoring for the protection of the R.O.W. to SDOT for review). Submittal and approval of Drainage Plan includes review of dewatering activities. An intake appointment is not needed for correction cycle resubmittal. For online submittal, just upload the documents and hit the “submit’ button, which may be active until "checked in" by DPD.	95%	Review of the building permit application can follow one of 4 different timelines for the initial review which can range from over the counter approvals to up to 18 weeks. Timeline for review of corrections is 2-3 weeks.	Cindy Hoover Permit Process Leader cindy.hoover@seattle.gov 206-233-2554	60% Street Improvement Permit (SIP) is required to be accepted by the Seattle Department of Transportation before the permit can be submitted. For the 3 (other than over the counter), the entire timeline including the plans being out for 2 weeks to address the correction for 2 correction rounds end up being approximately: 7 weeks and 2 days, 9 weeks and 2 days or 18 weeks and 2 days. A hard copy of both the signed permit and approved plan set are required at the construction site.
Demolition Permit	Required to demolish, deconstruct or relocate structures, including accessory structures, with more than 120 square feet of "projected" roof area (including overhangs).		Following documentation may be required: Site Plan If site contains ECAs - potential to submit Construction Stormwater Control Standard Plan and/or Tree and Vegetation Standard Mitigation Plan	95%	2 to 12 months. Timeline will depend on the complexity of the demolition.	Cindy Hoover Permit Process Leader cindy.hoover@seattle.gov 206-233-2554	Inspections are required prior to any demolition.
Electrical Permit	An electrical permit is required to install, alter, extend or connect any electrical equipment in a building or premises or allow the same to be done. Some exceptions apply. See code for exceptions.		Permits are of 2 types; over the counter and plan review. Over the counter permits can be processed online, faxed or at the counter on the Seattle Municipal Tower 20th floor. Plan review permits are for the following types of projects (issued with Building Permit): Installation over 2,500 square feet. All switches, fuses, circuit breakers and equipment rated at 400 amps or higher. All electrical equipment operating at over 600 volts. Services, feeders and power supplies for emergency, legally required, or fire pump systems. Electrical work in hospitals, schools and institutions. Transformer install over 112.5 KVA. Unique or particularly complex projects or an installation that can't be adequately described on an over the counter form.	95%	Typically issued over the counter for small projects. Larger projects typically up to 120 days when plan review required. Issued directly to subcontractor.	Cindy Hoover Permit Process Leader cindy.hoover@seattle.gov 206-233-2554	

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Grading Permit	The requirements for a grading permit are listed in section 22.170.060 A in the Grading Code. Grading Code can be viewed at, http://www.seattle.gov/dpd/codesrules/codes/default.htm . Triggers are based on general sites, grading in the Shoreline, grading in or near an environmentally critical area, grading in a potentially hazardous location, in-ground modifications, placing temporary stockpiles or grading near public places. Section 22.170.060 B identifies the exemptions to having to get a permit. Also, this type of permit is for only doing grading work when not associated with either a demo or building permit.		Site plans including vicinity map and legal description. Topographic map Drainage control plan Submittal and approval of Drainage Plan including Construction Stormwater Pollution Prevention Plan (CSPPP will include review of dewatering activities)	95%	60-120 days, timeline varies based on complexity of project.	Cindy Hoover Permit Process Leader cindy.hoover@seattle.gov 206-233-2554	All grading activity, whether or not it requires a permit or approval from the City, must comply with the provisions of the SGC. When the grading activity is not associated with an active building permit, a separate grading permit issued by the Seattle Department of Planning and Development (DPD) may be required. When grading is associated with a building permit, grading review and approval are a component of the building permit and a separate grading permit is not required. Grading review takes place only when the thresholds in section 22.170.060 of the SGC are exceeded.
Grading Season Extension Letter: Winter Construction Period	Conducting earthwork activity at a project with a grading season restriction or in an Environmentally Critical Area (ECA) during Seattle's wet season (Oct. 31-April 1). This provision does not apply to grading in liquefaction-prone areas and abandoned landfill ECAs, unless the parcel contains another ECA.		Grading Season Extension application Site Plan - showing where proposed grading activities will occur Schedule of the proposed grading and/or site stabilization work Signed confirmation from the project geotechnical engineer	None.	2 weeks until initial comments.	Susan Chang DPD Geotechnical Section Supervisor 206-386-9785 susan.chang@seattle.gov	
Side Sewer Permit (if not part of Contract)	Installation, repair or replacement of side sewers, service drains or storm pipe that discharge to the public sewer or drainage system including dewatering a work location.		Typically an over-the-counter (OTC) permit. Submit: Side Sewer Application Site Plan Other submittal information, if required: Side Sewer Easement Agreement Side Sewer Joint Use and Maintenance Agreement Temporary Sewer Connection Agreement Certificate/Attestation of Mailing Notification Side Sewer Evaluation and Certification Form	100% Plan	Typically issued over the counter.	Cris Horbelt SPU 206-233-2527 cristofer.horbelt@seattle.gov	An OTC permit and will be obtained by the contractor. If permit can't be issued OTC, review should only take 10-14 days.

PERMIT AND COMPLIANCE TRIGGERS

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Side Sewer Permit for Temporary Dewatering	Dewatering operations from a work location. A SSTPD is required for the following activities: •Deep excavations (> 12 feet). • Once acre or more of land disturbing activities. • If surface and/or subsurface water is encountered during construction activity. • Work in an Environmentally Critical Area (ECA). • Disposal of contaminated temporary surface and/or subsurface water during construction that was not originally expected to occur. • When advised by Seattle Public Utilities or DPD because of known concerns.		Submittal requirements include: Geotechnical Report Analysis for the influence of temporary dewatering activities adjacent to the street right-of-way. Point of discharge and proposed rate of discharge Temporary Dewatering Plan Phase I and/or Phase II Site Assessment Water Quality Treatment System design and operation (if applicable) Water quality (if applicable) and discharge volume, sampling, monitoring plan, and reporting Proof of NPDES Construction Stormwater Permit (sites greater than one acre)	100%	Typically issued over the counter (OTC) after the submittal docs have been approved during the Building Permit plan review. Larger projects typically up to 120 days.	Cris Horbelt SPU 206-233-2527 cristofer.horbelt@seattle.gov	Review of dewatering activities will typically occur with building permit application.
Stormwater Code Compliance	Initially, assume every project triggers the Seattle Stormwater Code (or the equivalent code for projects outside of Seattle). Drainage review is needed if more than 750 sq. ft. of land is dusturbed, more than 750 sq. ft. of hard surface is being added or replaced, or more than 750 sq. ft. of building is being or replaced.		Submittals vary and depend on your project design and location. Some of the topical areas to consider: • Construction stormwater control • Green stormwater infrastructure (GSI) • Grading; erosion and drainage control • Downstream collection system and receiving water • Impervious and pollution generating surfaces and vegetation • Flow control and stormwater treatment requirement • Soils Planning and assessment • Environmental Critical Areas at and near the site • DPD or SDOT Technical Information Report (TIR)	Planning and Options Analysis assessments, then throughout design	Varies and could take some time; plan early	Contacts and resources include: • Cris Horbelt, SPU (first acquire a working knowledge) • http://spuforms ("Stormwater Code") • Your project team	Compliance with the Stormwater Code requirements are complex and could delay your project, so start early and incorporate into your project schedule and budget.
Noise Variance	Construction activities outside of the normal hours identified in SMC 25.08. Typically 10 P.M. to 7:00 A.M. and any high impact construction noise (i.e., pile driving, jackhammers, and vactor trucks). Major Public Project Construction Variances. Variance may be granted if project has certain characteristics including the following: - Project is for a public facility as defined in SMC 23.84A - Construction duration of at least 6 months - Construction project will have a substantial impact on the provision of public services and public health, safety, and welfare		Temporary Noise Variance Application (not to exceed 14 days) Major Public Project Construction requires information on the type, time period and reasons, information about current noise control technologies, provisions from which a variance is being sought, and a Noise Management and Mitigation Plan.	90%			Major Public Project Construction Variance requires a public notice and comment period.

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Other Non-Standard DPD Permits	Following permits are typically not associated with SPU projects: Conveyance Permit Boiler & Pressure Vessel Permit Refrigeration Permit Fire Alarm Permit Sign, Awning, and Billboards Permit		Varies depending on the specific permit requirements.	Varies	Varies	Cindy Hoover Permit Process Leader cindy.hoover@seattle.gov 206-233-2554	Scoping of Permit Type meeting will identify the need for any of these permits.
Seattle Parks and Recreation							
Revocable Use Permit (RUP)	Any use of a park other than a park use (includes both permanent and temporary use of park land and park open space). A RUP is not needed for wetland delineation.		Application for Revocable Permit to Use or Occupy Park Property Form (Application will include vicinity map, design drawings, project description, and photographs). Note that a project may need to do process multiple times for different project activities. Significant impacts and more than 60 days of continued use are presented to the Board of Parks Commissioners for review and recommendation	65% (for simple projects) 90% (preferred)	3-6 weeks. Start early.	Donald Harris Phone: 684-8018 Donald.harris@seattle.gov Cheryl Eastberg is the SPU/Parks Project Coordinator (206.386.4381, cheryl.eastberg@seattle.gov)	Permits will define the and limit the duration of non-park use as well as contain conditions to minimize damage to park lands and, if appropriate require restoration among other requirements.
Partial Transfer of Jurisdiction (PTOJ) and possibily Initiative 42 (I-42)	PTOJ is required for permanent or long-term non-park use of park lands (i.e., an easement for a pipeline or structure). May or may not need if already have an easement with Parks. May need even if already have an MOA with Parks. May also need to meet I-42 (Ordinance 118477) or supersede its requirements, through Council approval.		Provide sufficient information on why the use of park lands is required for the project. Partial Transfer of Jurisdiction to another City department may only be authorized by action of the City Council unless ordered by Court action or established by other legal instrument or authority.	Dependent on level of impact	Dependent on level of impact. Can be 8 months or more.	Donald Harris Phone: 684-8018 Donald.harris@seattle.gov Cheryl Eastberg is the SPU/Parks Project Coordinator (206.386.4381, cheryl.eastberg@seattle.gov)	I-42 requires demonstration of no reasonable and practical alternative to change park land or a facility from park use and requires a public hearing and ordinance, and possible land or facility exchange. Exchange may not be requuired for a sub-surface or utility easement compatible with park use.
Seattle Public Utilities							
Obtain, Upgrade or Retire Water Service	Adjust, relocate or provide a new hydrant. New or change in water service (including retirement) is needed for project within SPU's retail water service area (city of Seattle, portions of the cities of Burien, Shoreline and Lake Forest Park, and parts of unincorporated King County)		• Apply for and receive approved water availability certificate • Complete water service application and scope of work form • Submit plan and receive plan approval • Street Restoration by City or SDOT approved private contractor • Provide copy of Restoration Permit	100% Water 90% SIP	90 days prior to needing services installed	SPU Development Services Office Phone: 206-684-3333 Email: SPU_DSO@Seattle.gov	Need to determine if contractor to obtain the permit. Also determine if there is any overlap with DPD mechanical permit.
Fire Hydrant Use Permit	Use of fire hydrant during construction when no other water is available.		Signed hydrant permit requirements form and fees.	NA	Minimum 4 working days prior to use (prefer 1 week)	SPU Development Services Office Phone: 206-684-3333	Typically contractor obtained. Applies to use of hydrants by others for non-firefighting purposes.
State Environmental Policy Act (SPU has its own Responsible Official)	SEPA is triggered if a project or nonproject "action" will be taken which is are regulated under Washington State and the Seattle Municipal Code. Consult the SEPA Responsible Official or your environmental review/permit specialist.		Typically a SEPA Categorical Exemption or SEPA Environmental Checklist with a Determination of Non-Significance. Also SEPA Environmental Impact Statement, or other documents such as addendums or supplements. May require special studies to prepare documents, so plan in advance.	Inquire at Options Analysis. Begin document at 60% or 90% design.	3 or more months (consult Jalaine Madura for processing)	SPU's Betty Meyer (SEPA Responsible Official) and Jalaine Madura (SEPA Administrative Coordinator)	Reference Seattle Municipal Code 25.05.704 for definition of an "action," review SPUs environmental policies (http://spuwebcms/SPUWEB/Policies/index.htm). It is important to consult your environmental review/permit specialist.

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Property Access or Easements	Needing to gain access to or work on private property. If public property, requirements depend on the public agency					SPU Facilities and Real Property Services	SPU real property services staff usually lead property research, purchases, sales and easements.
SPU Water Quality Lab Approval	Working near and on drinking water facilities		Review the work plan with the SPU Water Quality Laboratory	Preliminary and Final Design		SPU Drinking Water Quality Manager	The information in this row is new and in draft form, so may change

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Seattle Department of Transportation (SDOT) – Refer to CAMs							
Street Improvement Permit (SIP) - for CSO and other projects designated high priority (includes SPU Watch List projects)	Installation of <u>new</u> major street improvements, such as street paving, curbs and sidewalks. (The replacement of street pavement or concrete walk that will be disturbed in construction does not require a SIP. Installation of ADA compliant curb ramps do not require a SIP.)		Initially consult "Street Improvement Permit" in SPUforms (http://spuforms/). -Street Improvement Permit Application (see - http://www.seattle.gov/transportation/stuse_sip.htm) -SDOT Letter of Authorization -Project Scope and Details Form -Base Map Checklist -Survey Checklist -Survey -Base Map -Plans – 2 full size Hard Copies, PDF (usually show pavement restoration by contractor) -Drainage and Geotech Reports	30% and again at 60%, 90%, and 100% (Check process with SDOT)	6 to 7 months (or even 1 year)	SMT 23rd floor or by email at SDOTPermits@seattle.gov Consult Tanya Treat, SPU (Email tanya.treat@seattle.gov; Phone 206-615-1636), for current SDOT contact for your project	Contact SDOT, as process is being refined. Timing partially depends on the number of reviews and changes at and for each of the 30%, 60% and 90% cycles. Also, allow enough project time to design and submit 90% complete SIP plans to SDOT to obtain acceptance for Formal Review and Circulation prior to DPD Construction Intake Appointment. DPD Construction Intake is allowed after 60% approval is obtained. Note that the process is under refinement. SIP approval is by signatures on the contract plan mylars
Street Improvement Permit (SIP) - for non-CSO projects	Installation of <u>new</u> major street improvements, such as street paving, curbs and sidewalks. (The replacement of street pavement or concrete walk that will be disturbed in construction does not require a SIP. Installation of ADA compliant curb ramps do not require a SIP.)		Street Improvement Permit Application (see http://www.seattle.gov/transportation/stuse_sip.htm) SDOT Letter of Authorization Project Scope and Details Form Base Map Checklist Survey Checklist Survey Base Map Plans – 2 full size Hard Copies, PDF, Drainage Report and Geotech Report	30% and again at 60%, 90%, and 100%	6 to 7 months (or even 1 year)	Permit counter at SMT 23rd floor or by email at SDOTPermits@seattle.gov	Timing partially depends on the number of reviews and changes at and for each of the 30%, 60% and 90% cycles. Also, allow enough project time to design and submit 90% complete SIP plans to SDOT to obtain acceptance for Formal Review and Circulation prior to DPD Construction Intake Appointment. DPD Construction Intake is allowed after 60% approval is obtained. SIP approval is by signatures on the contract drawing mylars.
Street Use Utility Permit	Installation of underground or overhead utility services in the right-of-way (ROW). Consisting of occupation and/or construction in the ROW and for side sewer permits. Includes pipe or utility installation disturbing 100 contiguous lineal feet or more (or 300 or more cumulative lineal feet) of the right-of-way per project site, or ground disturbance within a crosswalk in an intersection, or new curb or sidewalks. Check with SDOT to see if the 100 feet is not additive of all sites, such as when the project consists of repair or replacement of pipes at different locations. For example, pipes are being replaced at 3 different locations (one in south Seattle, one in Ballard and another in Wallingford) - the pipe replacement is considered separate and if each is less than 100 ft., so this permit is not required.		See CAM 2600 - Submittal includes: Street Use Utility Permit Application Site Plans, Profile and photos Restoration Plan Traffic Control Plan May require other information (i.e. Historic District Approval, Noise Exemption) prior to permit issuance. Submittal is in person at the Street Use Permit Counter (SMT23).	100%, but check to see if these need to be submitted earlier, such as at 60% & 90%	6 weeks	Melody Berry Phone: 733-9052 Email: melody.berry@seattle.gov Email questions to SDOTPermits@seattle.gov For CSO and priority drainage projects, Theresa Smith is the SDOT Facilitator.	Some rehabilitation projects, such as a sewer repair of less than 100 feet or replacement of a watermain value, may not need a permit. Reference SDOT CAM 2600. For SIPs and street use permits, haul contractor should reference www.seattle.gov/transportation/trucksfeesandpermits.htm and www.seattle.gov/transportation/stuse_contact.htm Note: For CSO and priority drainage projects, Theresa Smith is the SDOT Facilitator.

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Street Use Over the Counter (OTC) Permit	Installation, repair or extensive maintenance on a utility in the right-of-way that impacts infrastructure and does not exceed the minimum requirements for a Street Use Utility Major Permit or SIP. Includes pipe or utility installation of less than 100 feet. Typically temporary use of the rights-of-way during construction, such as for material storage, scaffolding, crane placement or crossing curb and work with heavy equipment, per SMC 15.32.010.		See CAM 2600. The application can be obtained online or from the Street Use Permit Counter. Submit a Permit Application, Site Plan and a Traffic Control Plan, if on an arterial or within a High Impact Area. Submit application at the Counter, via email to SDOTPermits@seattle.gov or by fax to (206) 470-6988.	After contract award	Over-the-Counter permit. 2-6 weeks, however could take 8-12 weeks or more. SDOT has 5-15 work days for review, depending on whether a TCP is required.	Street Use Counter. SMT 23rd floor or email questions at SDOTPermits@seattle.gov	Typically obtained by the contractor, especially since payment is by the number of days. Review time is partially based on how many times revisions need to be submitted to SDOT. Note that for CSO and high priority drainage projects, Theresa Smith is the SDOT Facilitator.
Shoreline Street End Use Permit	Project located within a shoreline street end environment. Additional fee included with street use permit when shoreline street end used for non-public purposes.		Street Use Permit Application (needs to be obtained from the Street Use Permit Counter).	90%	6 weeks (and requires public notice)	Patti Quirk Phone: 206-684-8501 Email: patti.quirk@seattle.gov (Secondary contact: Kate Leitch)	It may not be obvious that your project is in a designated street end, so check if it is near a lake, river or Puget Sound.
Term Permit (Council Approval)	Term permits are required for long-term use of the public right-of-way for "significant structures" such as sub-surface or at-grade utility structures			30%		Street Use Counter. SMT 23rd floor or email questions at SDOTPermits@seattle.gov	SDOT is responsible for providing the legislation recommendation to City Council that includes the annual fee.
Stormwater Code Compliance	Initially, assume every project triggers the Seattle Stormwater Code (or the equivalent code for projects outside of Seattle). Drainage review is needed if more than 750 sq. ft. of land is dusturbed, more than 750 sq. ft. of hard surface is being added or replaced, or more than 750 sq. ft. of building is being or replaced.		Submittals vary and depend on your project design and location. Some of the topical areas to consider: • Construction stormwater control • Green stormwater infrastructure (GSI) • Grading; erosion and drainage control • Downstream collection system and receiving water • Impervious and pollution generating surfaces and vegetation • Flow control and stormwater treatment requirement • Soils Planning and assessment • Environmental Critical Areas at and near the site • DPD or SDOT Technical Information Report (TIR)	Planning and Options Analysis assessments, then throughout design	Varies and could take some time; plan early	Contacts and resources include: • Cris Horbelt, SPU (first acquire a working knowledge) • http://spuforms ("Stormwater Code") • Your project team	Compliance with the Stormwater Code requirements are complex and could delay your project, so start early and incorporate into your project schedule and budget. Even "small" projects have to comply with the Stormwater Code. Most typically for projects in the ROW, these will be limited to construction stormwater control where SDOT will review for those requirements.
Other							
Other Local Jurisdictions: Counties and other Cities	If the project or maintenance and operations activity is wholly or partially outside of the City Seattle boundaries, the other applicable city(s) and/or county(s) will likely require compliance with their permits or approvals.		Consult the applicable city(s) and/or county(s) for submittal requirements.	Recommend consult jurisdiction in options analysis or start of design	Depends on the permit, approval, and the applicable jurisdiction's processes	Applicable city(s) and/or county(s)	Work with the applicable jurisdiction(s) early in the project to determine what types of permits or approvals may be needed. The process could take quite a bit of time and could require additional project studies.